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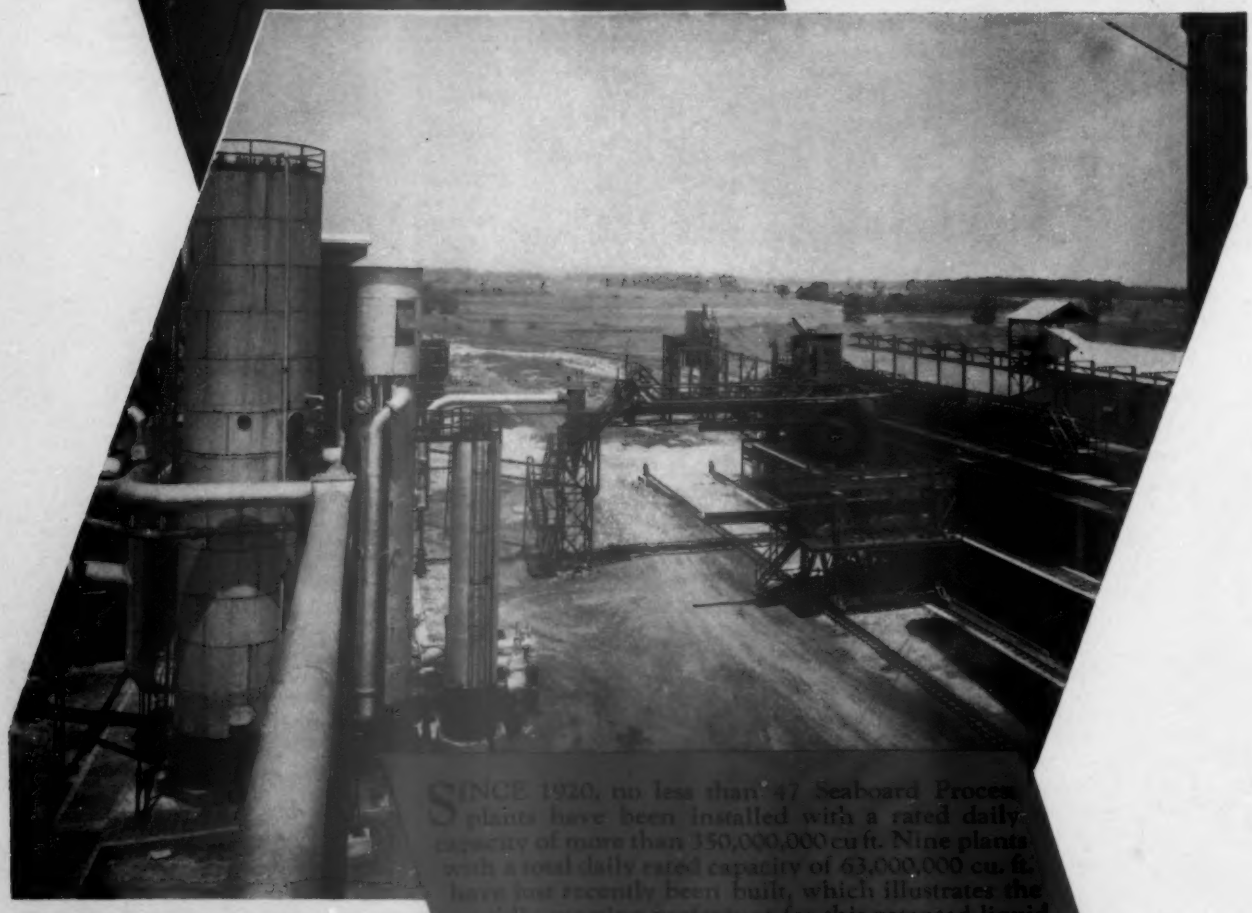
WESTERN GAS PURIFICATION PLANTS ARE OUTSTANDINGLY SUCCESSFUL THROUGHOUT INDUSTRY—



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"Western Gas" Products Include:

A. B. C. Gasmaker Grates — Naphthalene and Gum Absorbers
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Water Gas Plants — Gas Dehydration Plants — Holders (Gas, Oxygen, etc.)
Liquid Purification Plants — Oxide Boxes (Purifiers) — Welded Steel Pipe
Tower and Rotary Scrubbers — Valves

AMERICAN
GAS JOURNAL
Established 1859 *Pioneer of the Gas Industry*
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Vol. 133, No. 6 December, 1930 Whole Number 3684

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AMERICAN GAS JOURNAL, December, 1930, Vol. 133, No. 6 Published monthly by American Gas Journal, Inc., at 34 Crystal St., East Stroudsburg, Pa. Executive, Editorial, and Business offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 17, 1928, at the postoffice of East Stroudsburg, Pa., under the Act of March 3, 1879.

Subscriptions $2.00 per year, including postage in the United States, Mexico, Cuba, Porto Rico, Hawaii or the Philippines; in Canada $3.00; foreign $4.00. Single copies 25 cents.

GEORGE R. MACDONALD, *Advertising Rep*
53 Park Place, New York, N. Y.

JAMES T. HEED, *Advertising Rep.*
343 So. Dearborn St., Chicago, Ill.
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View of 30′ Diameter Semet-Solvay Welded Steel Purifier, New London, Conn.

NOTE the simple, convenient design, the smooth, rugged construction welded both inside and outside, the well-sloped deck and cover, the accessibility of the valves, the full depth hinged oxide doors and the high grade, efficient manifold construction.

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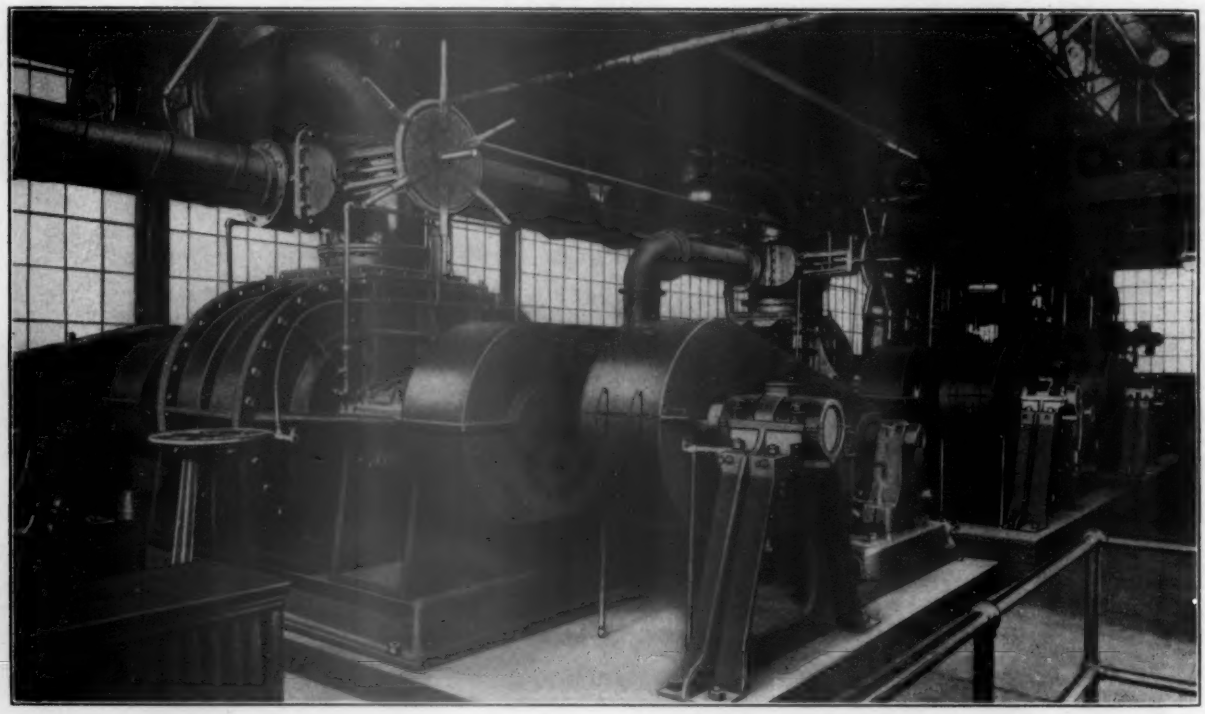

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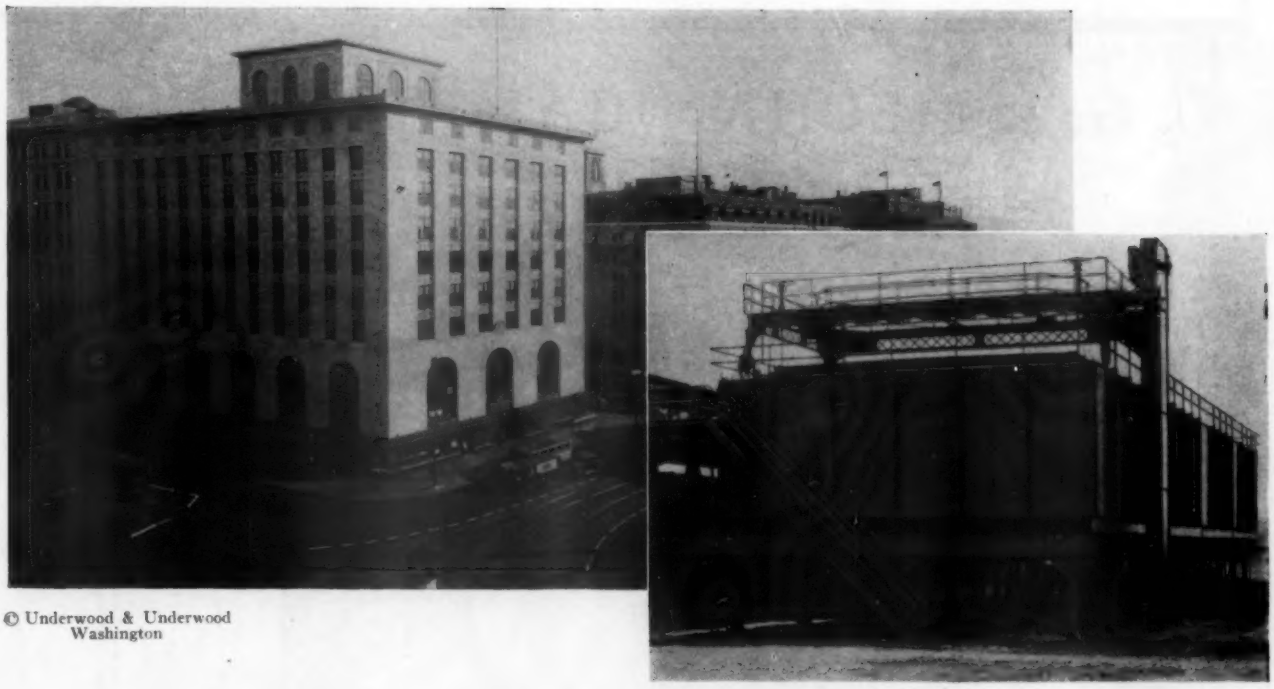

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—in Washington, D. C.

* "*BELIEVE it or not*"—there are other things in Washington besides the Capitol building, Washington's monument, embassies, congress and tariff questions.

So, we show you Fifteenth and New York Avenues to prove our point, and the Stacey Brothers purifier out on 27th Street, N. W., as final proof.

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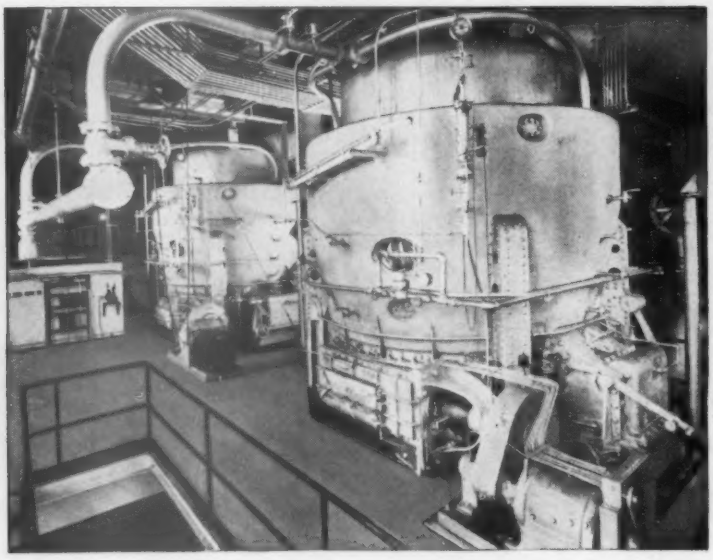

Three U. G. I. Mechanical Generators in the Chester, Pa., Plant of the Philadelphia Electric Company.

For PEAK LOADS with Manufactured and Natural Gas

The U. G. I. Mechanical Generator, in addition to its base load use, offers important advantages for peak load gas supply.

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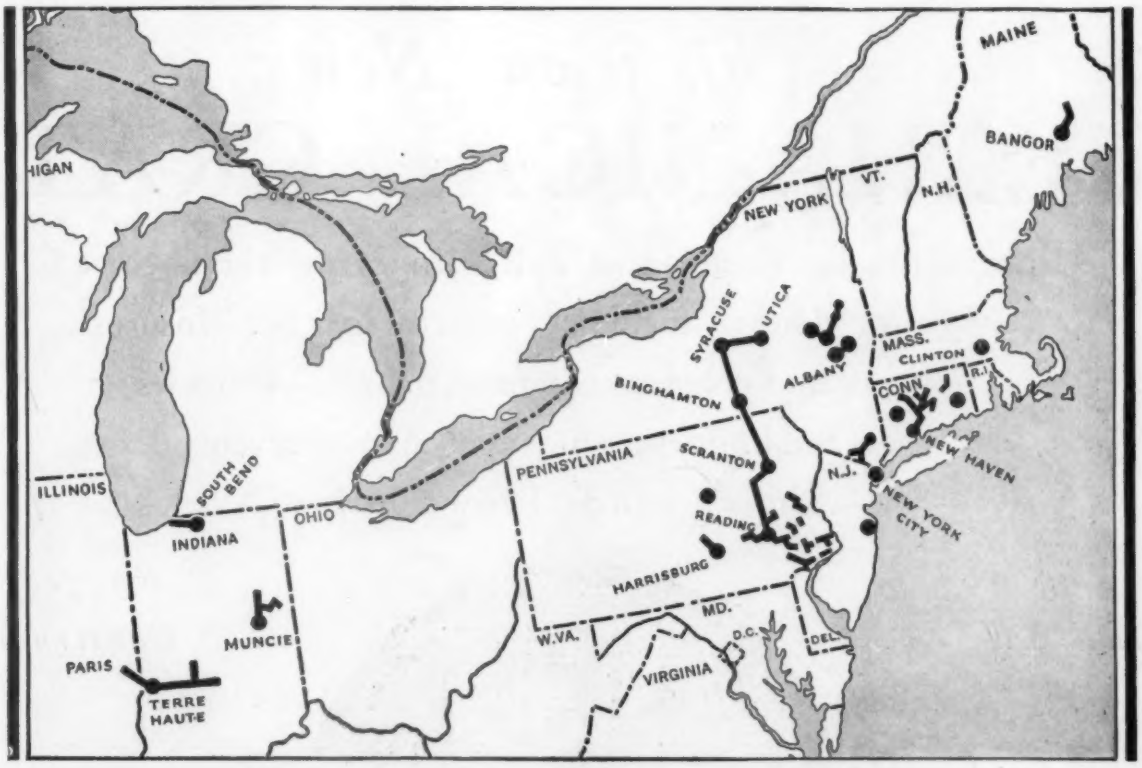

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COMPLETELY organized with equipment and personnel for pipe line construction and gas distribution work, we can efficiently and economically handle jobs of any size, from a few thousand feet of gas distribution main to cross-country oil, natural gas or gasoline lines of any length.

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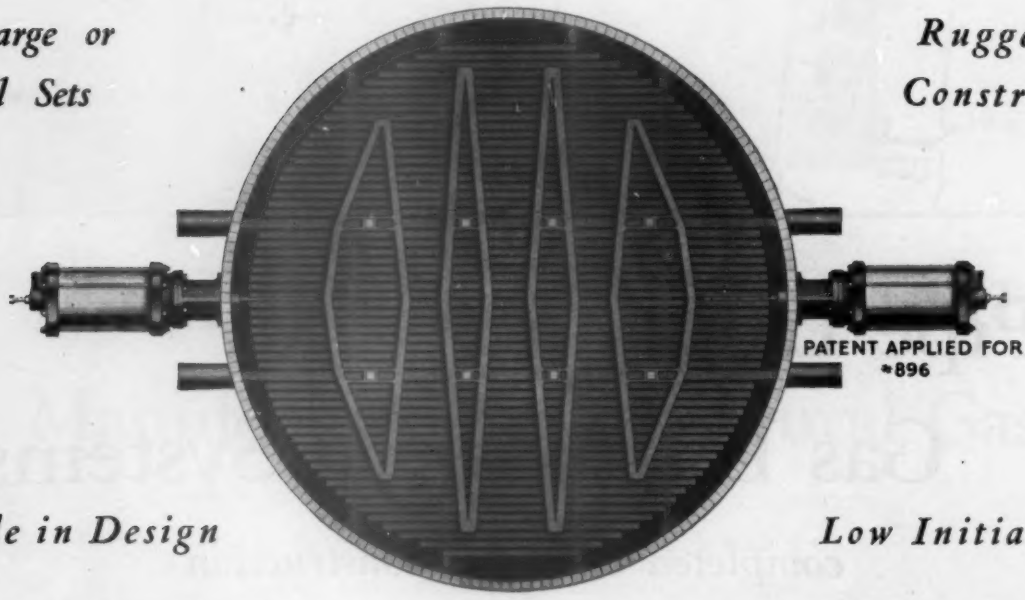

Simple in Design

Low Initial Cost

Note, in the illustration above, the peculiar shape of the drag bars. The tapering design of these drag bars produces a "plowing" effect and as the drag bars are moved over the surface of the grates in a reciprocating manner, the finer particles of ash and clinker are discharged through the self-cleaning grates, while the larger pieces of clinker which may have formed are crowded over the surface of the grates and discharged through the annular opening provided at the circumference of the same.

The two draw bars are connected at each end by a cross-head, which in turn engages the piston rods of the hydraulic cylinders. This hydraulic pressure is all the motive power necessary for operating the draw bars.

There are many other novel features of this New Mechanical Grate which we will be pleased to explain to you to your decided advantage. Write us.

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Greetings
The S. R. Dresser Manufacturing Co.

"Automatic Painting"
for permanent protection at low cost

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at Gas Measurement Engineering Headquarters

On measurement by Tinned Steel Case, Ironcase, Westcott Orifice and Linderman Orifice Meters.

WHAT type of meter will give best results for a given set of conditions? How can the measuring hook-up you would like to have be managed —with satisfactory operation a certainty? Are there efficient short-cuts—new meters—new practices—to accomplish each of your particular uses for measurement equipment?

In short, what is the last word having practical relation to your measurement problems as they will arise in the next installation? What's new, what's true, what's what—in measurement engineering?

You can always be sure of getting authentic information from *Gas-Measurement-Engineering Headquarters.* This source of basic research for positive displacement and orifice meter measurement presents broad, comprehensive and complete data. The information is easy to obtain; easy to follow; safe to use.

Here is a partial list of current American Meter Company publications. Check your files to see wherein they are not up-to-date, then ask us for the publications you want or describe the conditions to be met, if you wish specific recommendations or data.

• • •

AG-4 Recording and Indicating Demand Meters
E-6 Westcott Volume and Pressure Recording Gauge
E-20 Instruction on testing high pressure meters
EG-2 Westcott Orifice Meters
E-2 Measurement by Orifice
E-3 Metric Indicating Flow Meters
E-4 Positive Displacement Meters
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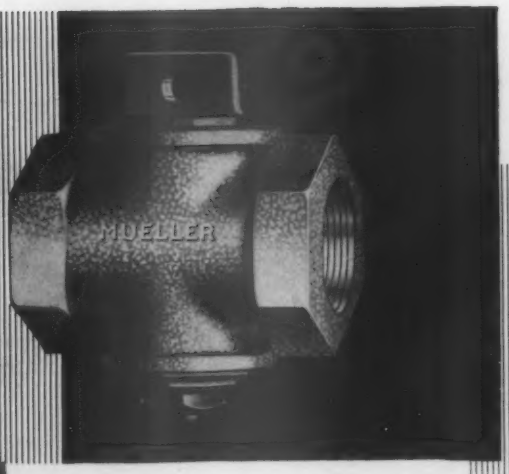
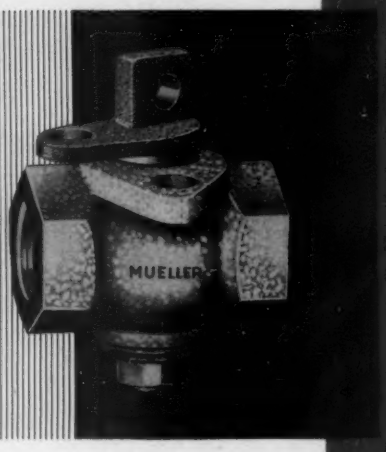


At left: Mueller G-11100 Flat Head, Iron Body Brass Plug Service Stop. *Below:* Mueller G-11080 Iron Body Brass Plug Meter Stop.



Quality- *or service failures?*

It's not what you pay on the market—it's the cost of repairing failures that determines the price you actually pay for stops.

The name of Mueller has been a guaranty of value for over three-quarters of a century. The enduring service of Mueller Iron Body Stops has caused leading gas companies to standardize on them the country over.

Made of the best gray iron—hot galvanized, with keys and washers of Mueller Red Brass and designed to provide the greatest strength where strength is needed, Mueller Iron Body Stops stand up under the heaviest installation strains.

Mueller Co. *(Established 1857)* Decatur, Illinois. *Branches:* New York, Dallas, Atlanta, San Francisco, Los Angeles, Chicago. *Canadian Factory:* Mueller, Limited, Sarnia.

MUELLER

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PRECISE functioning of every unit necessary to efficient and low cost of production, is the master key to real progress in the successful operation of your plant.

If your plant has not been showing progress in spite of all your efforts, there must be something fundamentally wrong somewhere.

Get at the *Real Facts!* Ascertain just where the trouble spots exist and thus, equipped with all essential data obtainable, appropriate remedies can be intelligently applied where they are needed and will be most beneficial in placing the plant on a sound, profitable basis.

With a background of over a quarter century in designing, building and operating hundreds of gas plants, which experience has broadened our analyzing ability, our men will undertake such a critical survey with every surety of success in locating the source of your trouble.

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ENGINEERS NEW YORK BUILDERS CHICAGO

WHEREVER PIPE LINES ARE LAID

LINDE Process Service is an important factor in assuring economical installation and satisfactory performance. It brings to the firing line the results of intensive laboratory research and years of experience pioneering the field. It helps organize the work under standards dictated by the best engineering and field practice.

This service has demonstrated its ability to lower costs, speed up the work, and enable the production of a permanently tight line with tough, ductile welds as strong as the pipe—fully 100 per cent. efficient.

Linde Process Service is available to users of Linde Oxygen.

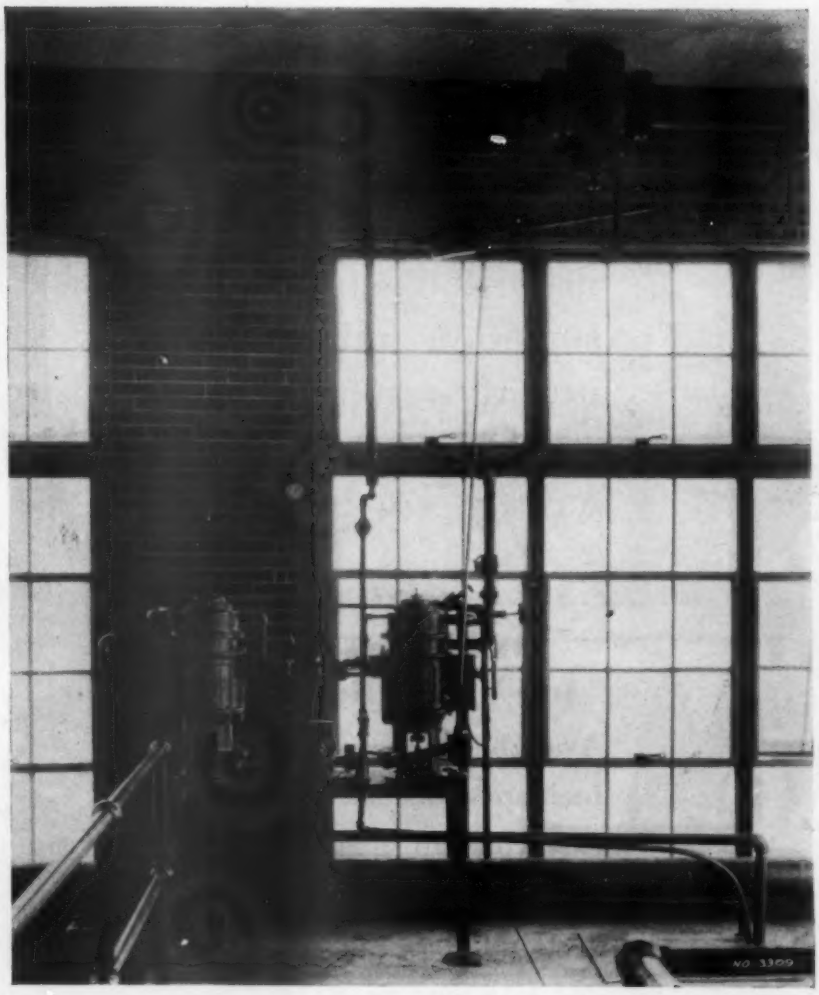
THE LINDE AIR PRODUCTS COMPANY, THE PREST-O-LITE COMPANY, INC., OXWELD ACETYLENE COMPANY, UNION CARBIDE SALES COMPANY,

Units of UNION CARBIDE AND CARBON CORPORATION

General Offices . . . . . New York UCC Sales Offices . . . in the Principal Cities

65 Linde plants . . . 48 Prest-O-Lite plants . . . 174 Oxygen Warehouse stocks . . . 156 Acetylene Warehouse stocks
42 Apparatus Warehouse stocks . . . 245 Union Carbide Warehouse stocks

SMOOT CONTROL OF GAS MIXING



A Smoot Gas Mixer is being installed at York, Pa., by the Pennsylvania Gas & Electric Co. This mixer will mix volumetrically a maximum of 160,000 cu. ft. of blue gas per hour with 75,000 cu. ft. of natural gas.

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"For every joint on every line"

IF A BONUS WERE PAID—

for leak-tightness, flexibility, freedom from line distortion—for low installation and minimum maintenance costs—

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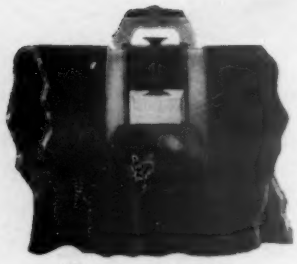

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This new Holder went into operation with the absolute confidence on the part of its builders, that by its record through the years it will add to Cruse-Kemper's reputation.
It was erected at Philadelphia, Pa. The capacity is 5,000,000 cu. ft.

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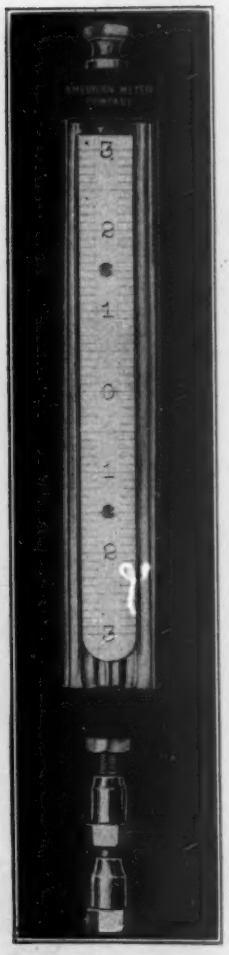
AMBLER, PA.

Manufacturers of GAS HOLDERS and other major equipment units for the GAS INDUSTRY

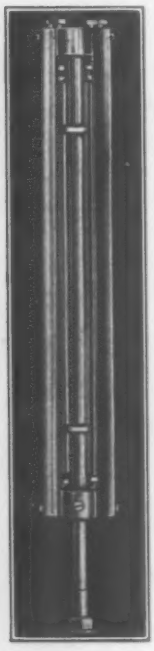
Four Important Advantages

IN PROTECTOR SIPHON GAUGES



6-in. Gauge (AL6-2) Showing Gauge Glass Protectors Fitted into the Bakelite Top and Bottom Brackets

American Meter Company Protector Siphon Gauges offer these definite advantages:



Rear View of 14-inch Gauge (AL6-6) in Miniature Showing Method of Fitting Protectors by Set Screws

1 **Protecting shields reduce glass breakage.**

The shields are shaped to protect the glass without interfering in any way with the legibility of the scale. They are chromium plated on nickel over brass, and are quickly and easily attached or removed. New practical utility and economy is added to both the improved Bent Glass and Straight Glass Siphon Gauges by these protecting devices.

2 **The uniform protector type of design makes gauges available with or without the shielding device as desired.**

3 **The entire line (ranging from the 14-in. to the 36-in. size) is standardized to incorporate the highest quality of material and the latest improvements in design, utility and economical usage.**

4 **This degree of standardization and a large production have made possible appreciably lower selling prices.**

For complete information concerning the American Meter line of Siphon Pressure Gauges write us for Bulletin AG-5

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BUTANE PLANTS IN 1930

Map showing location of operating Butane Air Carburetion Plants

ONE year ago only five Butane plants were in operation. These plants replaced other methods of gas manufacture. Today the total number in operation is thirty-eight; nine are converted plants and twenty-nine are in communities formerly without gas service.

A large potential field exists for new installations and there is a large number of coal and water gas plants which will earn greater profits when converted to the Philfuels Process.

Gas Manufacturing Division

« PHILFUELS COMPANY »

(Subsidiary of Phillips Petroleum Company)

7-101 GENERAL MOTORS BLDG. - DETROIT, MICHIGAN

This is all You Need to Open or Close a Darling Valve

Darling Outside Screw and Yoke Forged Steel, Flanged End Gate Valve with companion flanges bolted on. Dar-a-loy trimmed.

Comparisons favor Darlings. Take it from any slant you like—ease of operation, long life, accessibility, quick repair, or ultimate cost.

Men of wide experience in field practice—men who have made a thorough study of valve performance under the most trying condition, find Darlings most economical and most reliable in service.

Write for details of design and construction.

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WILLIAMSPORT, PA.

New York Los Angeles Oklahoma City Houston

DARLING

GATE VALVES

Over the top!
—TO ELIMINATE washouts

and cut down maintenance

LET old Bird Creek overflow whenever it will! Its raging torrents can never harm the two pipe lines on this 340-foot span, four feet above high water mark. Two well designed 12-inch bends on the right bank convey natural gas from the underground lines to the suspension bridge level. These bends also serve as expansion units.

Cities Service Gas Company took this unusual means to insure uninterrupted service and freedom from high maintenance costs at their Tallant, Oklahoma crossing. While they were anxious to obtain a neat appearing job on account of the nearby highway, their first concern was a successful engineering venture.

For this reason they chose pipe with a high rating for strength, ductility, uniformity and particular fitness for constructions as unusual as this. They said, NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY PITTSBURGH, PA.
Subsidiary of United States Steel Corporation

NATIONAL PIPE

Tycos Instruments

INDICATE
RECORD
CONTROL

Temperature and Pressure Throughout the Gas Plant

ALL along the line Tycos Instruments enable you to maintain correct temperatures and pressures in your gas plant at all times.

On the coal bench . . . the carburetted water gas machine . . . in the purification equipment . . . the distribution system . . . for highest efficiency, use Tycos Instruments.

There are 25 places in making coal gas —13 places in carburetted water gas— 9 places in producer gas—2 in oil gas —throughout the plant, Tycos Temperature and Pressure Instruments increase operating efficiency.

Write for Catalog Part 600, especially for the Gas Industry.

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Industrial Thermometers
Pressure and Vacuum Gauges
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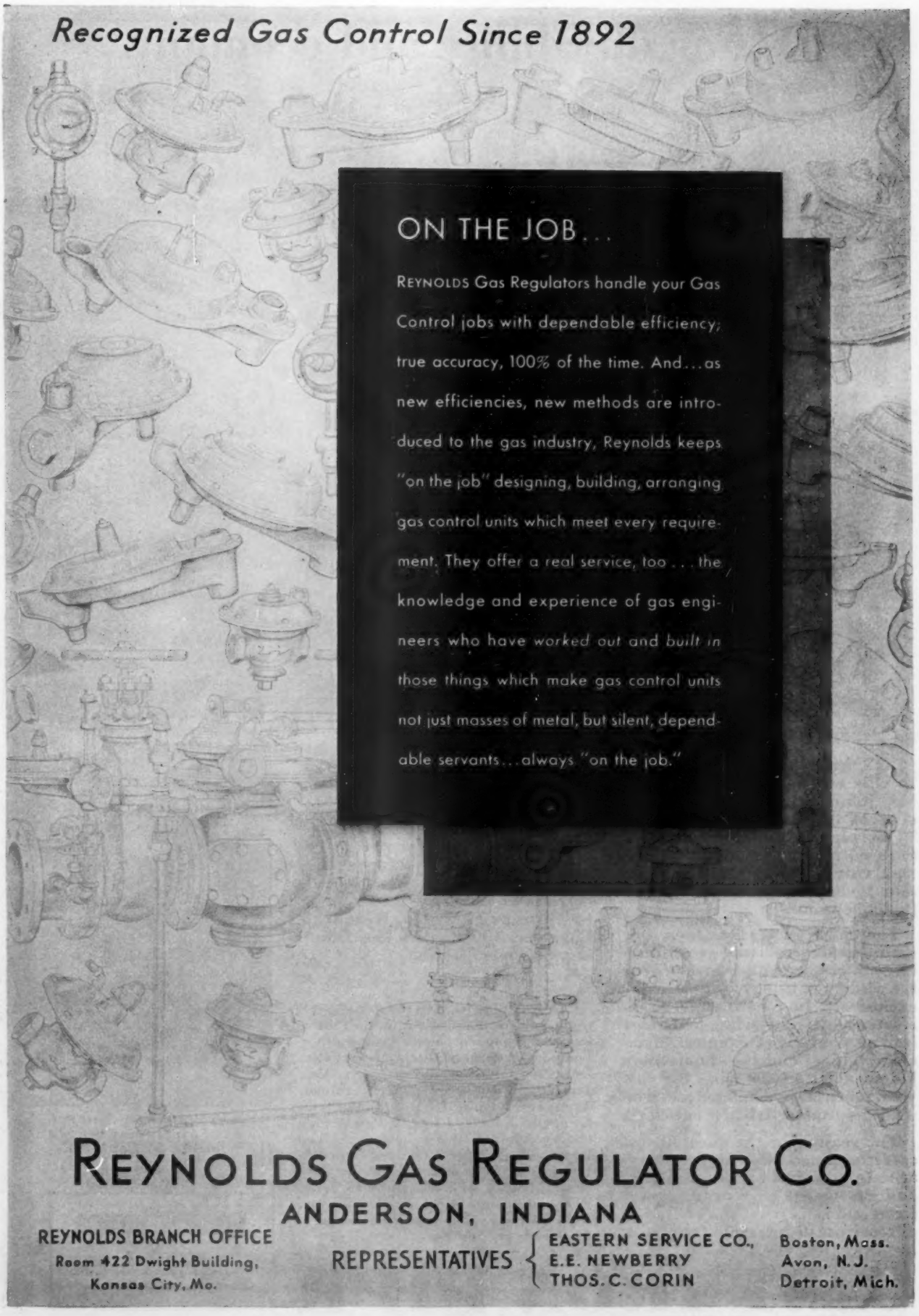
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REYNOLDS Gas Regulators handle your Gas Control jobs with dependable efficiency; true accuracy, 100% of the time. And...as new efficiencies, new methods are introduced to the gas industry, Reynolds keeps "on the job" designing, building, arranging gas control units which meet every requirement. They offer a real service, too... the knowledge and experience of gas engineers who have worked out and built in those things which make gas control units not just masses of metal, but silent, dependable servants...always "on the job."
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Photo by Ewing Galloway, N. Y.

"THE first cast iron pipe in Louisville was laid in 1860," writes Mr. John Chambers, Superintendent of the Louisville Water Co. "This pipe is still in service. We have no mains that are not of cast iron. Our mains vary in size from four inches to seventy-two inches in diameter."

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✣ ✣ ✣

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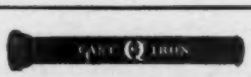
Engineers inspecting the installation of a large diameter cast iron main in Louisville, Kentucky.



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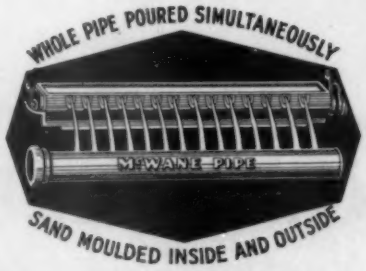

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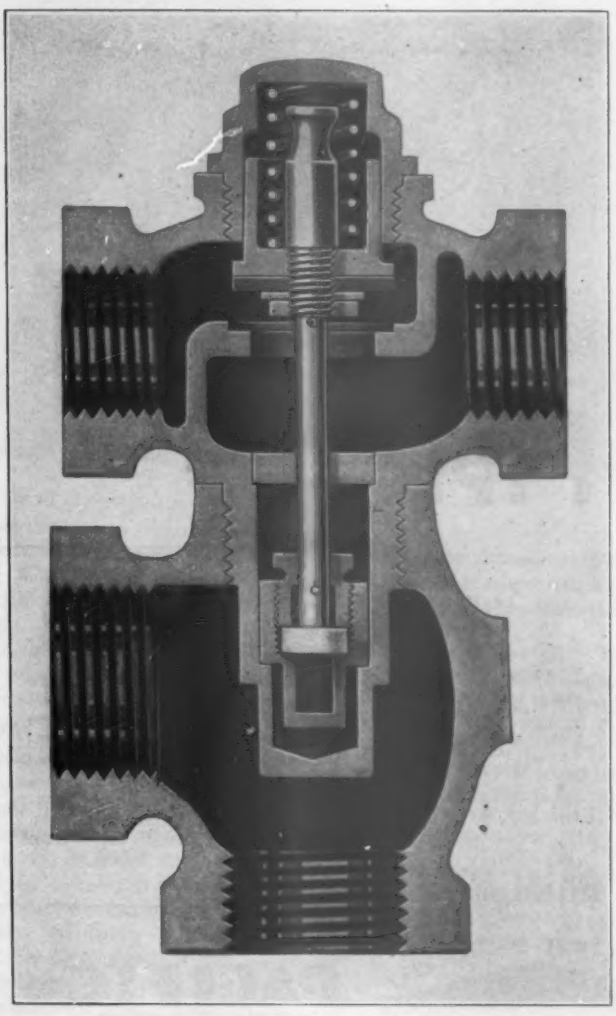
(In Gas Water Heaters)

(The Lovekin Emergency Gas Shut-off Valve)



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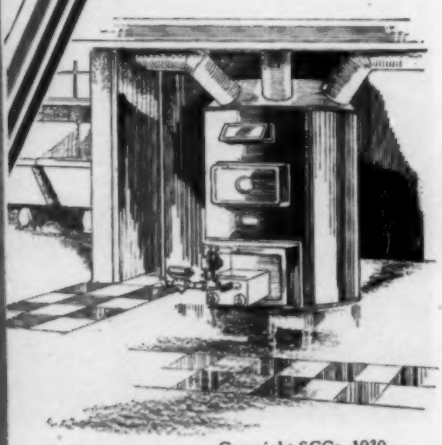

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GAS JOURNAL
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HENRY M. RILEY, Editor

Yuletide Greeting

IT is not so far a cry from the present day gas refrigerator and the active merchandising of Christmas goods to the humble corner gas lamp and the time when Yuletide was not unlike any other season during the gas industry's business year.

SOMEHOW we like to feel that the selfsame gas lamp symbolizes for us the spirit of Christmas As youngsters in those bygone days many of us recall the waning afternoon before the gala day and how we watched for the advent of the lamp lighter. Perhaps he came during the bitter cold when the wind—made him snuggle into his greatcoat until he resembled nothing more than a hugeous beetle, or mayhap he fought his way through driving snow. But always he came on time and always his taper officially set in motion the Christmas doings for us.

AND so to-day the gas industry emulating the faithful lamplighter and the cheery rays from the corner lamp keeps attuned to the fullest meaning of the Christmas season - service to mankind.
May the industry increasingly merit the most joyous salute ever sung

A Merry Christmas.

Distorting Gas Facts for Stock-Market Purposes

THAT INTANGIBLE, but highly potent, economic force called "Wall Street" is at last taking cognizance of natural gas, and at times with weird reasoning, some of which is sadly at variance with the facts. Just lately we have seen one of the most extravagant distortions of this sort, one which illustrates almost every principle of inferior merchandising with which we are acquainted.

The leaflet in question is issued by a Wall Street concern that evidently seeks to market natural-gas securities. It pictures natural gas flowing from the bowels of the earth, "a great elementary source of heat and energy perfected by the primeval chemistry of nature." It portrays manufactured gas a woebegone looking woman with an old-fashioned cook stove as its medium—"Too high in price—to low in heat value. Even the domestic consumer can seldom afford it except for cooking."

We commend those enterprising security companies that have seen the opportunity for sound financing and real benefit to their security customers in the field of natural-gas enterprises. Most of the newer developments in this field have been carefully considered and tested according to sound engineering and sound economic principles. They offer an opportunity for genuine investment with no more than that normal risk which attends all industrial enterprises of magnitude. We see no reason why a brokerage establishment should state more than the facts or should unnecessarily portray fictitious disadvantages of manufactured gas in the furtherance of security promotion. The facts are quite enough. And these facts do not include anything detrimental to the manufactured-gas business nor warrant criticism of manufactured-gas in any manner.

Public utility executives should see to it that not only their own representatives, but also the representatives of brokerage concerns dealing in their securities, stick to the facts. It is bad taste, and bad business ethics, to undertake the sale of any security by knocking a contemporary industry. There is especially no ground for this in the case of natural gas and manufactured gas. These brother industries are rapidly becoming Siamese twins in the intimacy of their association. Upon such basis they are prepared to serve the American people effectively and economically. There is no excuse for regarding them as competitors for public interest in the financial word.

By-Passing Old Sol

THE USE of artificial means for drying and accelerating the curing of certain farm crops has been resorted to in certain instances during the past few years with no small success. Mr. Arthur J. Mason, a prominent engineer of the middle west, has used solid carbonaceous fuel for crop drying on his farms for some little time and natural gas has also been utilized for similar purposes elsewhere. In the present issue will be found an article dealing with the drying of Alfalfa by the use of natural gas. Accordingly, the procedure, while not as yet of large proportion, would seem to bear study and investigation on the part of both the natural as well as the manufactured ends of the gas industry.

It is evident that one would have to have a very large farm in order to consider the financial outlay incident to the installation of a kiln and miscellaneous equipment, to say nothing of the running of a great length of main or service pipe, for artificially drying crops. Nevertheless, it might be feasible in certain cases for several independent farms in close proximity to have installed a community drying plant, particularly where a gas main would be relatively near. Such an arrangement might work out for manufactured and natural gas alike.

Obviously, the farmer would gain in time; in addition he could schedule his crop curing regardless of the weather, guarantee uniform farm products from year to year, and nullify any tendency to blight by germs.

The investigation of such farmer prospects might be conducted somewhat along the following lines. Someone from the Industrial Gas department could consult with the nearest agricultural college in order to secure information as to which crops would best lend themselves to such processing. Indeed, in this connection, it is highly likely that the college would cooperate in conducting any experimental work. If, after such a conference, the outlook merited further study, such items as the location of the gas main, cost of drying kiln installation and a preliminary parley with the farmers themselves could be followed out.

Gas, the great fuel of city folks, might yet be put to work for the farmer on a worthwhile basis.

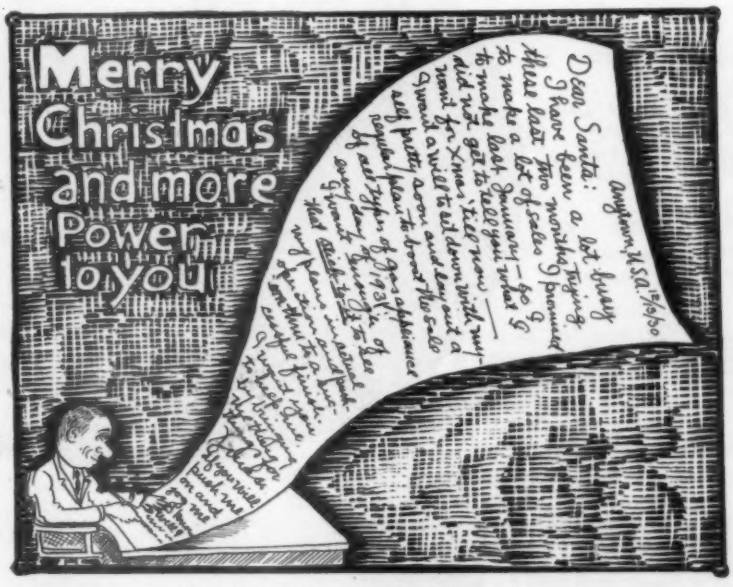
A Fine Movement

THE IDEA that the gas industry has no competition has been rather well punctured and accordingly, one must seek the reason for its increasing success in another direction. We have prospered, it would seem, largely because we—to state the matter bluntly—have played fair with our customers. We have shown a commendable eagerness to improve these relations; in other words, we are very properly never satisfied with the status quo of such efforts. Back of the whole situation is the healthy admission that we do not know it all and the applied desire to continue to school ourselves to the end that we will ever edge a bit closer to perfection. And so long as we follow this course, success will fasten itself around our necks with all the tenacity of the "old man of the sea."

During the past few years we have prided ourselves in

the fact that our employee-customer relations have been travelling along on a pretty high plane but fortunately, we now find that we can still do a better job in this direction. This is evidenced by the recent course in Employee-Customer Relations instituted by American Gas Association.

It is particularly fitting that this educational effort is getting under way at the present time. Due to the general status of business there are doubtless a large number of people whose nerves are on edge and it will certainly constitute a bright spot through their being able to look forward with more than average pleasure to their contact with the gas company and its employees. These are times when a wholehearted smile and a pat on the back will assist one in his outlook and the course in question would seem to key in with this condition. It is especially recommended to those who might harbor the thought that they have but little more to learn relative to the subject. Others will immediately grasp the opportunity to further cultivate the public's good will.



Here's hoping he gets a full stocking

Emergency Service

THE ABILITY of the gas industry to supply its customers with uninterrupted gas service over a long period of years is one of its proudest heritages. And when it is considered that this continuity of service has been maintained during times of extreme stress, it is evident that sound planning rather than accident or coincidence was responsible for the condition.

As we extend our service it is apparent that further study will be necessary in order to continue our record of continuous service. Thus, the introduction of natural gas into manufactured gas towns with the prospect of greatly augmented utilization, especially where the gas is coming from a considerable distance, will necessitate some stand-by arrangement in order to carry on in time of breakdown. This will require the keeping of the gas plant in readiness to start on short notice, thereby entailing the expedient of having available a skeleton organization of gas makers and similar help.

In the case of a large natural gas industrial customer who must conduct his process or work uninterrupted, it will be necessary to consider the feasibility of having some sort of standby equipment in his plant in the event of any breakdown in service. In such a situation, the butane plant as a standby might be worth investigating.

Another place where a standby of butane could help in guaranteeing continuous service would be in the small retort plant, where additional holder storage would be expensive and yet the likelihood of breakdown of a portion of the gas making equipment during peak demand would be imminent.

The above situations and others are continually cropping up and while there exists a solution for each case sound engineering experience will be necessary in order to attain the best guarantee of uninterrupted service.

Care of Small Tools

EVERY GAS COMPANY during the course of its work has recourse to the use of innumerable small tools such as wrenches, hammers, stocks and dies, screwdrivers and a host of others. Relative to such equipment it is sometimes the case that the workman is not entirely painstaking in his care of them nor does he become perturbed in the event of their breakage or loss. This may be due to the fact that he too frequently thinks in terms of the larger items in the business such as gas holders, compressors, gas making machines and the like, and regards the small tools as trifling and insignificant.

Moreover, the purchasing department at times considers the small tool in somewhat the same light and as a consequence pays but little attention to its proper selection and purchase.

In our experience we have encountered more than one case where an inferior stillson broke and resulted in an accident to the man using the same. We have also run across instances where a dulled screw driver or broken handle shovel has been responsible for faulty workmanship. Further, we have heard of cases where the small tool bill ran outrageously high due to loss and haphazard care.

Since these items cost the gas company good hard cash, their selection by the purchasing department and subsequent handling by the workman should be carried out with care and intelligence. Generally speaking, small tools are as much entitled to this attention as are a recording calorimeter and gas holder, for instance.

Welding Simplifies Gas Distribution Problems

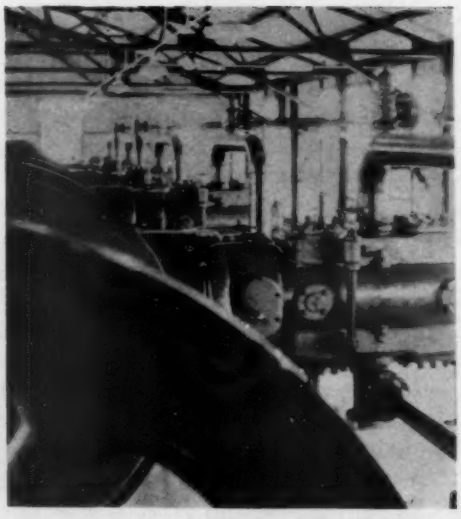
Oval—Bend in 6 inch Oxwelded gas main running between Waltham and Concord, Mass. A part of Boston Consolidated system.

Middle left—"Slack wallops" in 24 inch Oxwelded natural gas line.

Middle right—Cold bend made on 20 inch Oxwelded natural gas pipe line. One tractor holds pipe down while another lifts up the end of the pipe.

Lower left—Oxwelding 24 inch natural gas pipe line running from Texas to Indianapolis.

Lower right—Oxwelded piping in natural gas compressor station of Humble Oil and Refining Co. at Sugarland, Texas.



Success of Oxy-Acetylene Welded Pipe Lines

G. O. CARTER

Consulting Engineer, The Linde Air Products Company, New York

T. W. GREENE

Engineer, Development Section, The Linde Air Products Company, New York

THE most important activity in the pipe line industry this year has been the phenomenal development and construction of gas lines, to some extent for the transportation of manufactured gas, but principally for the transmission over long distances of natural gas. Only a few years ago the transportation of natural gas, for example 250 miles, was regarded as a wonderful achievement. This year has witnessed the starting of building of enormous lines, 22"-24" in diameter, running over 1,000 miles in length in order to make available to communities in Illinois, Minnesota and Indiana the cheapest and cleanest of fuels produced in the gas field of the Panhandle section of Texas and other mid-continent fields. Three major 24" lines have been started from the Panhandle field this year; one of these to the Omaha and So. Nebraska regions; another, the Amarillo to Chicago line being built by the Continental Contruction Company for the Doherty-Insull interests and other companies, and the third one by the Missouri-Kansas Pipe Line Company to Indianapolis and other towns in Indiana and Kentucky. Oxy-acetylene welding, with the exception of the first one, which was constructed with rubber couplings, has been used extensively in the construction of these large diameter, major projects, the lines being built by what is known as composite contruction, in which two to three or more joints are welded together and then coupled.

Guaranteeing Tight Joints

Oxy-acetylene welding has offered to the gas industry an economical and leak-proof joint that has proven highly satisfactory. Any review of published statistics on leakage will reveal the success of welding in reducing the leakage to a negligible figure; in fact, leakage as low as 10,000 cu. ft. per year per mile per 3" equivalent has been accepted as standard, a figure undreamed of before the advent of welding. It has been reported, that leakage tests have actually shown an increase in the gas in the line, although officially it has never been reported where any testing division of an operating department has credited the construction department with creating gas as a result of employing welded construction. Welding, nevertheless, has forced refinements in metering and measurements.

The more or less standard practice today has been to use solid welded construction for lines smaller than 18". Solid welded construction also has been used on larger sizes, as 18" and 20". Above 20" diameter, however, the general practice has been to use composite construction.

Special Engineering Required

It is desirable to review some of the reasons why composite construction is used on the larger lines because the solid welding of large diameter presents and necessitates special engineering consideration and construction. Theoretically, the unit stresses set up in a large pipe as a result of temperature drop are the same as for small line, but due to their very nature, there probably is an unequal distribution of the contraction forces in large diameter which impose higher stresses on certain elements than on others. The problem is further complicated by the introduction of differential stresses in a large line during construction. Moreover, it is exceedingly more difficult to provide adequately the slack in the line required to compensate for contraction. Slack wallops in a 24" line are shown on the opposite page. The laying of these wallops, which at the best provide for only about half of the contraction requirements, imposes very high stresses, stresses so high, in fact, that failure may occur unless the welding is of the highest quality. These are only temporary and are relieved on lowering the pipe to the bottom of the trench but complicate the laying of the line.

In addition to the temperature stresses, there are super-imposed bending stresses which from the very nature of the line cannot be minimized in the larger diameters. Smaller pipe can be easily cold bent to fit the contour of the ground closely but in the larger diameters this cannot be carried to such accuracy, with the result these strains may become very excessive. Theoretically for the same deflection the stresses will increase in proportion to the diameter which, although they may be negligible for small diameter, become very high as the pipe sizes increase. These, of course, can be reduced and alleviated by changing the construction from that of a solid continuous tube to that of a series of free length beams, as it were, by the introduction of couplings properly placed. It is for his reason, as well as the simplification in construction that composite construction has been more extensively used in the larger sizes.

There is need for development of more satisfactory procedures and methods in the way of bending the pipe to meet the contour, of providing for expansion-

Portion of a paper read before Annual Convention, International Acetylene Assn., Chicago, November 12-14, 1930.

contraction, and of adopting practices that will assure extremely high weld quality to withstand the strains set up on the circumferential joint in the construction and operation of large diameter lines. These features have received careful consideration and engineering thought and procedures have been developed which have proven satisfactory to meet all requirements. But further thought and time are necessary to put these into general practice and to speed up the construction to prove universally acceptable.

One development has occurred this year which may prove of decided importance in the future construction of large lines. It has been the generally accepted theory of engineers that the maximum length of pipe between rubber couplings should be limited to about 100 feet in order that the leakage will be minimized at the rubber couplings. This year has seen the establishment of a precedent in which lengths as long as 350 feet have been solid welded and it will be interesting to note what effect this will have under operation. Should this prove satisfactory, it will lead to the welding of practically the entire line, taking advantage of leak proof and economical qualities of the welded joint, yet with simplification of construction attending the use of rubber coupled joints at long intervals.

With the transportation of gas enormous distances, economical factors have introduced and necessitated the use of extremely high pressures, which, in turn, have required special high strength pipe. Pipe in large diameters today is being used having a carbon content of .30 to .40% and an ultimate strength higher than 80,000 lbs. per sq. in., even as high as 100,000 lbs. The welding industry, fortunately, has kept abreast of this development in materials and due to the improvements in welding and the development of special welding rods, welded joints can be made as strong as the pipe.

The welding of such large diameters and of pipe material of such high strength has necessitated raising the quality of the welding to such an extent that "superperfect" welding is required to meet the construction and operating services. One outstanding development which is being followed this year to give assured high weld quality is the use of a thin backing up liner to aid in the welding of the pipe joint. These liners are of thin material, about $\frac{1}{16}$"—3/32" thick, depending upon the pipe diameter, and about 1¼"—1½" wide, which fit the inside of the pipe joint under the butt weld. The liner with the spacers attached to it, accurately governs the spacing and permits the operator to fuse readily for the full wall thickness. In fact, with special design of liner, it is possible to reinforce the inside of the joint, fusing to the liner, making it an integral part of the weld. There are, of course, no protrusions or icicles and yet it is reinforced on the inside to give a full strength joint even without external reinforcement which it fallaciously had been assumed compensated for weakness that often occurred at the bottom of the joint. The liner so snugly fits the inside of the wall that there is little obstruction, if any, to the flow of the transmitted fluid. On the larger diameters these have proved to be economical and desirable in obtaining the weld quality necessary.

As stated before, the oxy-acetylene welded joint has been economical. With the development of efficient welders and the welding more on a mass production basis, which the industry has enjoyed, the cost has decreased. The cost today in welding even the large diameters is less than the cost of welding the smaller sizes several years ago. Means of reducing the cost and speeding up the wedding have been given careful consideration. Suitable progress has been made along these lines in the way of using larger flames, decreasing the angle of the vee and in keeping the weld as small as possible. Moreover, there has been a decided reduction of the depth of fusion into the sides of the vee, as the practice in the past of melting for quite a distance into the walls of the pipe, carrying a large weld, is somewhat extravagant and costly. Many of these developments place oxy-acetylene welding in a favorable position with competitive processes.

Workmanship in general has shown a decided improvement in the last few years. More and more the companies engaged in welding are closely qualifying and checking the welders and with development of suitable portable testing machines, now available, this type of inspection has proved decidedly advantageous in increasing the quality of the workmanship. The workmanship on some of the larger lines being welded, as a result of this engineering control, is of a quality unbelievable a couple of years ago. In fact, a study of their test results shows that every joint is nearly as perfect as the pipe.

Turkeys and Gas

NEW Yorkers took their Thanksgiving seriously this year. Turkey and the "fixin's" were the order of the day, with the result that the send-out of gas to customers of the Consolidated Gas Company of New York and affiliated gas companies was the largest for any Thanksgiving Day in the history of the company.

More than 164,000,000 cubic feet of gas were sent to customers in the territory served, including Manhattan, Bronx, Westchester County, and portions of Queens. This is several million cubic feet in excess of the previous Thanksgiving Day record.

Figures of the company indicate that the largest demands for gas occurred during the period from 11 A.M. to 2 P.M., when Mr. Gobbler was acquiring the necessary "sun tan."

Company officials stated that the unusually low temperature prevailing probably contributed to the increased demands for gas fuel on the part of the customers.

Natural Gas to Heat Tom Thumb Golf Courses

A MANUFACTURER of gas heaters has received an order for gas logs for use on a miniature golf course in Hollywood, Cal. The logs, which will use natural gas for fuel, are to be used in open-air fireplaces scattered over the course, making it possible for devotees to play Tom Thumb golf all Winter, warming up at the fireplaces between shots, and adding a new use to the more than 23,000 known uses for natural gas.

A New Industry Calling for Natural Gas

J. LYLE VANCE
Exhibit Manager, Natural Gas Bureau, Los Angeles

View of a Furnace used for Alfalfa Dehydration

SCIENCE is coming to the aid of the farmer in many new ways and gas has stepped into the picture again, lending its assistance in a most satisfactory way. One of its newest applications in the Los Angeles area is for the dehydration of alfalfa hay.

In Van Nuys, California, suburb of Los Angeles, the Fernando Valley Milling & Supply Co. built early last summer an alfalfa dehydration unit and have pioneered an industry which has as its object the preparation of alfalfa products of unusually high feed values.

Mr. G. G. Steere, the President and General Manager of the Fernando Valley Milling & Supply Co., saw the need for a higher quality Alfalfa "Leaf and Blossom Meal" than was being produced from field cured alfalfa and determined to produce a special brand of this valuable poultry feed from dehydrated alfalfa. Calling in the Humphreys Manufacturing Co., Inc. of Los Angeles they made a very extensive study of existing forage dehydrators, even sending a man to various points in the United States to observe similar machines in operation. After collecting data and consulting with agricultural specialists in some of the departments of agriculture of the University of California, they built their present dehydrator.

Advantages of the Method

Van Nuys is a city of 18,000 population and the dehydrator is located in the city yet this enterprise opens up a new field for the farmer. Now the alfalfa grower may cut his crop and load it upon trucks right behind the mower, haul it to the city and sell it within less than half a day after it is cut. Hazards from unfavorable weather, which so often causes heavy losses owing to the time required to cure the hay by nature's process, are a thing of the past.

Further, when dehydration is to constitute the system of curing, the hay may be cut greener which gives the grower more cuttings per season and produces less woody fibre in the finished product. Many times hay that is cut and field cured is so bleached in the sun drying process, owing to dews or fogs, that it commands a low price; or the weather is so dry that the hay cannot be handled without all of the valuable leaves shattering off in the process. Also, hay lying in cocks an undue time holds back the hay under the cocks and makes for slightly reduced tonnage from these spots.

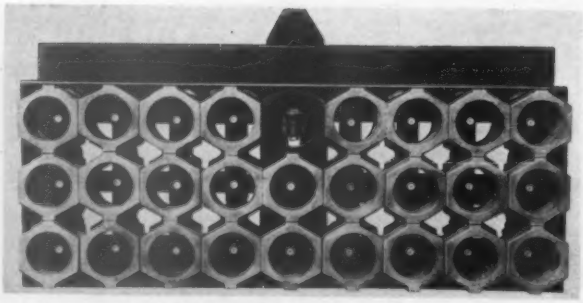
The bleaching of alfalfa takes from it the Vitamin "A," so important to animals and poultry. The hay being treated at this plant is of such high quality that at present it is being ground to a fine meal or flour for mixing with other feeds for poultry exclusively, and the high price it commands makes this much the best commercial outlet for the products of this mill. This high vitamin "A" feed is of great benefit to poultrymen owing to the deficiency heretofore of this important element in the concentrated rations in common use and adds much to the feeding success of modern large poultry producing units.

Vitamins Increased

By analysis it was found that the Vitamin "A" content of the dehydrated product was seven times greater than average hay and ten times greater than much which is being fed. It is claimed that 5% of meal made from this dehydrated alfalfa mixed in the poultry mash makes a better feed than 10% alfalfa meal made from sun cured hay. University authorities also claim that greens supplied in this way are as effective as the fresh ones, that the protein content is 10% higher and the fibre content 10% lower. There is but 5% moisture in the finished hay or meal. Its freedom from the dust which collects in hay cured in the field is a very great advantage. Furthermore, it is stated that the temperatures maintained in the dehydrator effectively kill all weevil, beetles, moths and other insects which would destroy the product in storage and these same temperatures also sterilize all weed seeds and prevent their growing after passing the dehydrator. This tends to keep the product from being excluded from any states or communities on account of regulatory laws.

The dehydrator which has been devised is ninety feet long, twenty feet high and ten feet wide. This is divided into three tunnels, the upper one receiving the hay first.

The hay is carefully spread on the traveling conveyor leading up to this tunnel to insure an even continuous depth to the very edge. (The conveyors in the various tunnels run at different speeds.) Passing through this tunnel it is dropped to the center tunnel where it returns toward the loading end. At the end of this tunnel the hay is dropped again to the lower tunnel where it is finished off and passes out to the grinding mill. Here it is ground and sacked and is ready for shipment. The entire time interval from the time the hay is unloaded until it reaches the grinding mill is thirty minutes. It is but eighteen minutes in the dehydrator itself.



View of Firing and of Leahy Burners used in Dehydrator Furnace

Type of Burners

There is a gas-fired furnace and blower for each tunnel. The burners used are Leahy Multi-Jet burners and the blowers are Claridge No. 4, handling 25,000 cubic feet of air per minute with electric motor drive. One blower is operated by a 30 H. P. motor and the other two are driven by a single motor of 50 H. P. and a 25 H. P. motor drives the conveyors. The bearings of the blowers are water cooled since they draw the hot air for the dehydrator directly through the open flame gas furnace.

The Leahy Multi-Jet Gas burners are what is known as their 3 x 9 size, which means the burners, each 3 inches in internal diameter, are arranged in three tiers, nine burners wide. Gas is supplied at 2 pound pressure and at this pressure each furnace has a maximum capacity of 7,280 cubic feet per hour of 1100 B. t. u. natural gas.

The construction of the furnaces is simple and consists of a fire box of oblong rectangular shape lined with firebrick reinforced outside with "I" beams and tie rods. The burners are set low in the front and an arch extending back some three feet is built over them. Above this arch is an opening somewhat greater in area than the inlet of the fan. At the back of the furnace the fan inlet is connected and the suction of the fan draws the air through the opening above the burners and takes in the products of combustion from the burners directly into the dehydrator. Even the atmospheres created by using the gas by-products are considered to be beneficial. The effect of the carbon dioxide in the air passed over the hay is said to produce a quality in the finished product which cannot be duplicated by indirect methods of heat application and for this reason gas is preeminent as a fuel. This system of heating would not be possible, of course, with solid or liquid fuels due to the smoke, soot, dust, ashes and sparks which would be carried through with the products of combustion. It will be seen, therefore, that by using gas, considerable investment in the construction of the furnace is saved and the product improved.

To use fuels other than gas would mean either the installation of steam boilers and heating coils or warm air furnaces with vast amount of heating surface.

A few minor changes have been made in the operation of the dehydrator since its erection to increase efficiency and production, but no changes have been made in the gas burners or the furnaces. The multiple jet principle of the burners has long been recognized as most sound and one which has rightfully gained much popularity in the Los Angeles area. These furnaces are adjusted to various burning rates, as a temperature of 450° F is maintained in the upper tunnel, 325° F in the center tunnel and 225° F in the lower tunnel. The heated air enters the upper tunnel at the point where the hay enters, a part of the air is exhausted from this tunnel, but a little is allowed to pass into the center one. The air in the center tunnel also travels in the direction of the hay travel and exhausts under the conveyor carrying the hay up to the entrance of the dehydrator, serving as a sort of preheating blast. The air from the lower tunnel also exhausts at the same point.

Controller to Be Installed

At the present time, ten tons of alfalfa meal per day are being made which represents about twenty per cent of the weight of green hay fed to the machine. To do this work 220,000,000 B. t. u. are required on an average. Days when the delivered hay is heavy with dew causes the gas consumption to go up, while on other days it falls correspondingly lower.

At the present time the furnaces are not thermostatically controlled, but Mr. Steere stated that he intends to put on automatic controls of an approved make in the near future. In the opinion of Mr. Humphreys of the Humphreys Manufacturing Co., insulation would be well worth its cost although the present dehydrator is uninsulated.

The natural gas is of approximately 1100 B. t. u. per cubic foot and is supplied by the Southern California Gas Co. with Mr. C. C. Cloud, Industrial Sales Engineer handling the details of the gas service installation.

Mr. Steere feels that with the present attention being given to forage crops and their most efficient utilization by all agricultural interests, wherever natural gas is available there will be interest in using it for dehydration and stated further that he found nothing in solid or liquid fuels which would recommend them to him for this particular process. He feels that with the controlability of gas, its freedom from fire hazards, its cleanliness and dependability, it is the logical fuel for this work.

From the gas company's angle the load is a desirable one, as it is a summer load builder and is very constant. Gas utilities throughout the country might well encourage the installation of forage crop dehydrators in their various communities for the summer business it creates for the general industrial and agricultural benefits it brings.

The Tetralin Process For Cleaning and Maintaining Distribution Systems

DR. G. WEISSENBERGER

Petroleum Zeitschrift, 1930, pages 855-857

JUST as keen as the interest of the technical man has been with respect to the protection of the exterior of the pipe against corrosion and destruction, just so slight has been his attention to the prevention of the corrosion and destruction of the interior of the pipe. Both carbon dioxide and water vapor are contained in gas in addition to small quantities of oxygen and the action of these substances results in change of the surface of the iron and the latter is slowly converted into the oxyhydrate with eventual rusting. Even though this process takes place with extraordinary slowness, nevertheless its effect becomes clearly noticeable within the course of years. When the coal gas has not been properly purified in the gas works, then naphthalene and tar are deposited in the mains. Furthermore, heavy hydrocarbons are also found in the mains as a general rule. These substances have a lubricating or greasing action on the walls of the pipe with which they come in contact and commonly effect a retardation of the rusting process. Hence it may be said that these deposits in the distribution system act in a measure to prevent the internal corrosion of the mains.

The increase in the recovery of by-products in the manufacture of gas has led in many gas plants to the practice of washing out the benzene and therewith other hydrocarbons from the gas which becomes relatively dry. When the gas passes into the distribution system, it gradually dissolves the protective layer which adheres to the walls of the mains and pipes. That is, the light oil vaporizes and the rust on the walls of the pipes and mains dries out. The rust therewith becomes pulverulent, and the gas is able to carry the former along within it through the distribution system, for this dust is very fine.

Migration of Naphthalene

Furthermore, the addition of water gas to the coal gas in the manufacture of mixed gas also favors the afore-described phenomena. In the case where the naphthalene is thoroughly washed out and where such a naphthalene-free gas as water gas is added, the phenomenon of the migration of the naphthalene deposit sets in, for the gas becomes saturated with the naphthalene that is present adhering to the walls of the mains, and this naphthalene is again deposited on the colder walls of the distribution system, so that the excess in the gas is precipitated. When this takes place, it is found that the naphthalene does not deposit in the usual manner in the form of solid, lumpy masses, as in those cases where the deposits of naphthalene intermingled with deposits of tar. On the other hand, it deposits in the form of large, light crystals, which can actually be blown away by a breath of air. However, the naphthalene deposits, that are present in this form in the distribution systems, quickly reduce the effective cross-sectional area of the mains and pipes or else obstruct them altogether, due to the fact that naphthalene possesses an extremely great volume under these conditions.

Facilitating Corrosion

Due to the migration of the naphthalene deposits from the points at which they were first deposited, these surfaces are stripped bare of coating and thus a new opportunity is afforded for the formation of fine dust and fine rust.

Difficulties arise when natural gas is distributed through mains and pipes which were formerly used for distributing dry coal gas. In this instance the coal gas has been dehydrated by artificial means before it is allowed to enter the mains. Such mains may also have been used for distributing coal gas over long distances, and in this case the gas has been previously purified as effectively as possible by washing.

It can be established, that where natural gas, which is commonly very dry, has been brought into a distribution system, which has previously been employed for the distribution of manufactured gas, considerable dust is formed and a large number of disturbances due to this dust ensue. The leather bellows in the gas meter tend to become dry and stiff, and the flange packings begin to leak. In the case of this gas, which is dried by means of compression, increases in the disturbances due to dust and naphthalene are commonly encountered in the transition period between the wet and the dry gas. However, these difficulties have been found to be less serious than those which are introduced into the distribution system due to the use of natural gas.

If a certain amount of sand dust is also present in the natural gas, then the most important causes of the disturbances that take place in the distribution system, are still the corrosion products, which had been formed due to the previously effected action of the moist distillation gases on the distribution system, the service mains, the gas meters and the like. When natural gas is introduced into the mains, these deposits nevertheless dry out very rapidly, become dusty and then are carried away by the flow of gas. The dust deposits in the regulators, service lines, gas meters, reduction valves, piping, etc., and it is commonly the cause of the complaints of insufficient gas supply and other phenom-

ena, which can be classed together as all being due to the presence and deposition of dust.

Effect on Diaphragms

The leather of the diaphragms in the gas meters becomes hard and dry. Inasmuch as there can be present in the gas no foreign matter, which can bring about these disturbances, the whole question must rest only with the drying out of the leather. It has however been established, on the other hand, that a new or freshly impregnated leather diaphragm possesses twice the life in the case of dry gas as in the case of wet gas. The phenomena, which takes place on the introduction of natural gas into the distribution systems, are consequently caused only by the fact that the leather diaphragms,— whose oil content, obtained by impregnation, has been supplanted during the course of time by water or light oil,—are subjected to the phenomenon, that the lighter and more easily volatile substances in the oil are carried away slowly by the dry gas.

As long as manufactured coal gas is being distributed, this circumstance does not arise, for the reason that the benzol hydrocarbons, which are contained in this gas, have the same or similar action on the leather as heavy mineral oils. On the other hand, when the leather comes into contact with natural gas, then the water or the light oil, which is contained in the leather, is quickly taken up by the gas, and the result is that the leather becomes dry and stiff. Other results which can be traced back to the absence of light oils in natural gas and which are manifested in the distribution of this gas are shrinkage of the flange and valve packings with the result that they become pervious and allow gas to escape by leakage.

Results of Dry Gas

Coal gas, which is compressed so as to increase its pressure, and hence gas, which is distributed over long distances, is treated in the gas works so that considerable quantities of the oils that are contained in it are removed. When a gas of this type is allowed to enter the gas distribution system, which has previously been employed for the purpose of distributing moist gas, two phenomena take place. In the first place the disturbances and difficulties in the distribution of the gas, as explained above, appear, but in addition thereto there is manifested an increase in the disturbances which are caused by the deposition of naphthalene, in those cases where the distribution system contains old deposits of this substance. These disturbances take place even when the gas is itself free from naphthalene. For under such conditions the pure gas becomes saturated with naphthalene, which it absorbs from those places in the mains which are warm,—the naphthalene coming from the former deposits,—and this naphthalene is then deposited at cooler points in the distribution system, such as for example the service pipes, in the gas meter connections, etc. These deposits possess the form of light, flocculent crystals, and it is a fact that only a small quantity of naphthalene in this form is sufficient to fill up a pipe completely. If the gas that is being passed through the mains contained any light oil, then at least a portion of the light oil would be simultaneously deposited along with the naphthalene. Under these conditions the formation of flocculent crystals is prevented and instead a dense, hard deposit of naphthalene is formed, which does not take up much room in the pipes.

When purified coke oven gas has to be distributed under pressure over long distances and furthermore when the peak loads must be taken care of by the distribution of water gas, then it occasionally happens in the summertime, when no water gas or only a little is distributed, that there is an increased tendency for disturbances to take place in the distribution system due to the deposition of naphthalene. This is probably due to the fact that there is lack of light oil in the gas that is being distributed.

There appears to be a tendency in Germany, as well as elsewhere, to distribute gas which is thoroughly purified in the effort to recover from its valuable by-products. There is accordingly presented the important distribution problem of protecting the gas mains and pipings from the inside, as well as from the outside, as heretofore. Such a protection is essential likewise in those cases where the gas that is being distributed is not dry; this in order that the distribution systems may be cleaned and also so that the numerous deposits that are formed may be avoided.

Failure of Former Methods

Up to the present time there has been no process available or known that affords a uniform and effective treatment of the interior of a gas distribution system. Various means have been used for overcoming local disturbances and difficulties that arise in gas distribution. Thus for example, the mains or pipes are blown out with the aid of compressed air, or alcohol or xylol may be sprayed into the main and vaporized so that the deposits that clog it up may be disintegrated and removed. However, there are many practical reasons why such schemes cannot be applied in the treatment of the entire distribution system as a unit. In the first place this is impossible from the technical standpoint, as the substance, that is used for such a purpose, cannot be uniformly applied to the surfaces that are to be cleansed in the distribution system. In the second place, were this method practical from the technical standpoint, it still could not be used on account of the great expense involved.

In order to keep the distribution mains and pipes as free as possible from deposits, great care has been taken in the purification of the gas so that those substances, which have a tendency to deposit from the gas on to the walls of the mains and pipes, are removed from it as thoroughly as possible. Thus for example, the naphthalene content of the gas has been reduced to a minimum by passing the foul gas in the gas works through carefully constructed and correctly operated naphthalene washing apparatus, with the result that only a small amount of naphthalene remains behind in the gas after it has left the purification plant. Nevertheless, one fact immediately appears as striking, and that is that such installations have only a very limited action and do not and cannot render any service at all as far as the protection of the inner surfaces of the mains and pipes is concerned. The reason for this is that they act just like a filter; consequently, they remove the injurious substances from the gas with more or less great effectiveness, and thus they prevent largely the entrance of these substances into the distribution system. Nevertheless, they cannot prevent in spite of all this, that residual masses of naphthalene reach the mains and form in time appreciable deposits. Furthermore, the purification of the gas, as carried out above, cannot remove the deposits that already exist in the distribution systems and render ineffective their injurious action.

The tetralin* process, however, represents a method, which has become available for the first time, for freeing the entire distribution system completely and uni-

formly from deposits of all sorts, tar, napthalene, rust dust, etc., and also for protecting effectively the inner surfaces in the distribution system and the various apparatus used in the distribution of the gas, such as governors, boosters and the like, the gas meters, leather diaphragms, etc. The process consists in that the gas is made to absorb a certain quantity of tetralin before it enters the distribution mains. Only a small amount of tetralin vapor is required for this purpose. The vapor that is thus absorbed is carried by the gas to the most distant points in the distribution system.

Tetralin is a water white, easily mobile liquid, which boils at a temperature of 207 degrees C. It is itself obtained from a by-product of gas, namely naphthalene, which is hydrogenated. Hydrogenation, or the addition of hydrogen to naphthalene, converts the solid into the liquid substance. Tetralin is an excellent solvent for almost all organic substances and possesses the property of dissolving large quantities of naphthalene, as may be expected from the relation it bears to this substance. Both tar and pitch dissolve well in this solvent. Tetralin vapors are strongly absorbed by those parts in the distribution system that are covered with rust. The tetralin penetrates through the rust and moistens it throughout and actually combines with it. Furthermore, tetralin prevents the rusting of the free iron surface and it also makes leather soft and pliable.

Action of Tetralin

When tetral vapors are introduced into the mains, the first phenomenon that is observed is the softening of the hard deposits that exist therein. These deposits flow together and collect in the lowest points in the distribution system. The pasty consistency of this mass is gradually converted into liquidity, whereupon it flows into the drip pots. In the first stages of the tetralin treatment, the mass that is found in these drip pots is black and slimy and consists of a mixture of tar, naphthalene and tetralin, as well as rust dust, sand, wooden splinters, jute fibers and similar impurities, which are carried along by it.

As the treatment is prolonged, the run-off into the drip pots becomes more and more clear, until finally the mass is only slightly colored. The distribution system is then completely free from all impurities. The inner surfaces of the mains and pipes are covered with a thin film of tetralin, and this is effective in preventing the formation of flying dust and in avoiding any further rusting of the pipe. The entire inner surface of the distribution system is thus protected. Then again the original lubrication of the leather diaphragms in the gas meters by means of light oil and water is supplanted gradually by the tetralin, which replaces the light oils, so that the softness and elasticity of the diaphragms remain unchanged.

The tetralin also absorbs the last traces of benzene, which the gas still contains, and therefore prevents the run-off of this valuable by-product into the drip pots. It also prevents the loss of hydrocarbons through the same avenue of escape.

Thus the tetralin process allows both complete protection of all the inner surfaces of the distribution system as well as of the apparatus used in the transmission of gas, and also effects the cleansing of the mains and pipes. For this reason when the tetralin process is used, dry gas can be distributed without fear of any disturbances arising. Furthermore, the benzol washing of the gas can be carried out to such a point, as is expedient from the commercial standpoint without there being any fear, that the distribution system or the gas meters will suffer on account of the removal of the benzene.

Two methods have been worked out for the application of the tetralin process by the Maschinen-und Apparatebau-Gesselschaft Martini and Hueneke m. b. H., Berlin, Germany. In the first process the tetralin is converted into vapor form by the cold process and in the second case by vaporization with the aid of heat. In the cold process the tetralin is atomized with the aid of suitable apparatus directly into the gas. The required pressure for this purpose is attained by means of a small auxiliary compressor. The gas is removed from the principal main and passed through the tetralin vaporizer. The process is protected by patents.

Cost of Process

The costs that are involved in the use of tetralin in continuous operation are claimed to be extraordinarily small. At the beginning of the treatment, when the mains and pipes contain considerable deposits and impurities, the amount of tetralin consumed is considerably greater than later on, when the solvent is used merely to protect the distribution system. Under these circumstances a state of equilibrium is attained. Hence at the beginning of the treatment the cost may amount to about 0.4 to 0.45 cent per thousand cubic feet (this is calculated as closely as possible from the German cost in pfennig per 100 cubic meters). As soon as the run-off into the drip pots has become light in color, then the amount of tetralin fed into the gas may be immediately decreased by half and when the distribution system has been thoroughly cleaned of all deposits and impurities, the quantity of tetralin used can be decreased to one-third or one-fourth of the original amount. Hence the cost may be quickly reduced to from 0.2 to 0.25 cent per thousand cubic feet and then finally in continuous operation to no more than 0.07 to 0.14 cent per thousand cubic feet. The slight cost of the tetralin is far more than counterbalanced by the good results that are obtained from its use.

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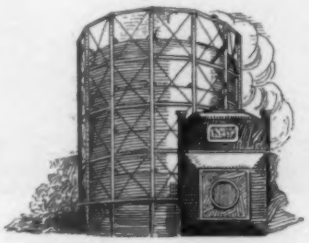
* *Tetralin is readily purchasable on the open market and listed in the Oil, Paint and Drug Reporter for example, as a regular commercial chemical. It is a hydrogenated naphthalene, being tetrahydronaphthalene, and was one of a group of similar solvents developed in Germany during the war to take the place of the petroleum distillate solvents of which there was acute shortage at the time.*



The Gas Bill in this Birmingham Home averages $45 per month for the six months heating season

Selling Gas Househeating In Birmingham

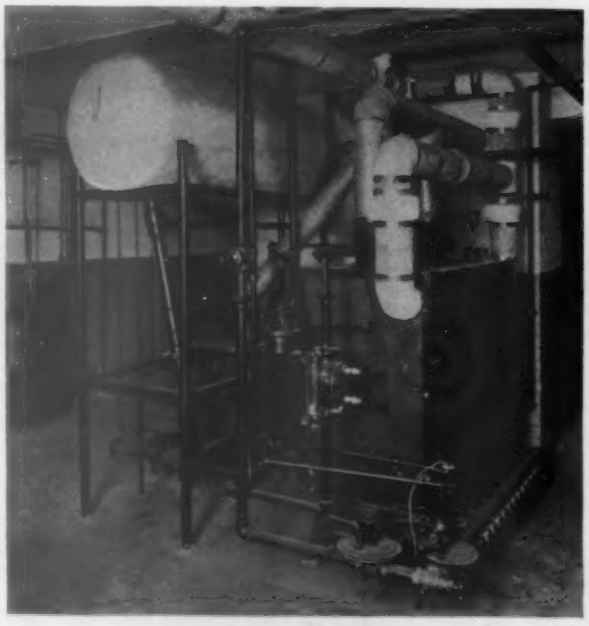
GEORGE H. WATSON

A HOUSE heating campaign in which 700 jobs were completed in a year's time is the record of the Birmingham Gas Company. This included both installations of new gas furnaces and conversions of old ones from coal to gas. Officials of the company expected the jobs to total 900 by Jan. 1, 1931 and with Birmingham sold on gas heating they expect to do *four times* as much business in 1931.

The company started from taw in October 1929, a few months after being organized and taking over the gas department of the Birmingham Electric Company. This record was made with manufactured gas in the "Pittsburgh of the South" where coal is plentiful and cheap and where competition with coal interests was consequently keen. A significant part of the campaign was the number of sales made during the Summer months.

In beginning the campaign in a city where little gas heating had been used before, it was assumed that every house owner was a prospect. The 40,000 customer users of gas for cooking, refrigeration, etc., were also considered potential buyers of house heating equipment. The elegant showrooms at the central office were consequently fitted up with house heating equipment to catch the eye of customers who came in to pay their gas bills. Advertising material was also mailed out with the gas bills.

Geo. H. Slaughter is sales manager of the company and Howard J. Bowman is in direct charge of the house heating department. He is assisted by George W. Loeffel.



Gas Fired Furnace in the home shown above

The first task in beginning the campaign was to select a sales force. Twenty-five applicants were picked from those answering advertisements. These men, known as junior salesmen, were given a brief schooling in the elements of house heating and were started on the task of "punching" door bells. They were required to make a card report on each call.

After this preliminary house-to-house survey the sales force was cut down to 15 men with a supervisor for each five men. Men with college training were selected where possible. These men are paid a base salary plus a commission. A sales meeting is held each work day except Saturday at the beginning of the day

With the sales force now thoroughly organized the real job of selling was begun. The card reports were used as the starting point. Each salesman (the term cadet is used instead of salesman) was made responsible for a particular territory. A call was made back on those persons card-indexed as probable customers. These cards were taken care of by a card clerk who arranged them both alphabetically and as to the date the prospect asked the salesman to call back. The alphabetical arrangement enabled the office to look up any prospect's card and to deal directly with him should he come to the office before the day he asked the salesman to come back.

Obtaining Basic Data

The salesman on the return, if he found the customer favorably inclined, asked permission to make a house heating survey. If given permission he obtained sufficient data on the job to permit the engineers in the office to make a complete estimate of the cost of installing a gas heating system or making a conversion job, as the case might be. This data included figures as to the size and type of heating system in use, a dimensioned diagram of the house and the piping system and information as to the size of the rooms and window space in each room.

The engineer from the salesman's survey arrived at the size and type of furnace that should be installed, its cost and an estimate of the annual operating expense. Armed with this information the salesmen went back to the home to sell the job. Most sales were closed at night when both the husband and the wife were present. After the customer signed the contract the company wrote him a letter of acceptance, being careful to restate its terms. This forestalled possibility that customers might say later that promises were made by the salesmen or by the company which had not been fulfilled.

It might be said here that the gas company was very careful in the contracts it took. In many instances it was necessary for the customer to make material changes in the piping systems to meet the rigid specifications of the company. Officials of the company realized that substituting a gas burner for a coal burner is not a cure-all for heating ills. It was for this reason that a careful survey was made of the existing heating system. In many cases the furnaces were found to be too small for the houses in which they were installed. Some of the systems inspected were not more than 40 per cent adequate.

Very Few Complaints

The carefulness of the company in installing its jobs is evident in the fact that very few kicks have been made by customers. Executives were particularly anxious that the first 1,000 jobs in Birmingham would give complete satisfaction. Results show almost 100 per cent endorsement by customers.

Installations were all handled by the service department of the company, thereby making the customer's contact solely with the gas company on the entire job. The company sub-lets outside plumbing and tin work, but men in these lines deal directly with the gas company. Incidentally relations of the company with the heating trades have been pleasant.

An inspector of the gas company passes on the completed job and is the last word as to whether it is OK. This inspector works out of the sales department and has the sales department's desire to please the customer. Consequently he is sure to have any defects in the installation job which he can detect, corrected from the start. The furnace is lighted up for the customer and tried out before the inspector leaves.

A monthly record of gas consumption is kept in the office for each customer. This is kept alongside the estimate of the operating cost made at the time of the installation. In case there is a wide variance between the estimated cost and the actual cost the company has a chance to correct any defects in the system as soon as they show up and before the customer has a chance to kick. It is significant, however, that operating estimates prepared by the engineers have not varied more than five per cent from actual consumer's bills. This is an indication of the accuracy with which the company makes installations.

In order to lay the groundwork for this estimate of the operating cost it was necessary to obtain weather data from the U. S. Weather Bureau for the last ten years. Although Birmingham is located in the Gulf region the temperature is sufficiently low in the Winter to make house heating a necessity. Although the lowest average temperature is several degrees above zero the idea of giving satisfactory service at this point prevailed in the installation of all new boilers. In the installation of conversion burners consideration was given to existing conditions and this rigid rule was not enforced to the letter.

Figuring Operating Estimates

Operating estimates were figured on the basis of providing 73 degrees of temperature during 16 hours of the day and 65 degrees during the other eight night hours. It might also be stated that figures were based on a 540 B. T. U. content for Birmingham gas. With these fixed figures it was possible for the engineering department to take the survey of any house and arrive at the heat loss ratio and subsequently to estimate the operating cost within five per cent of actual operating figures.

As a sales help photographs of houses where gas heat had been installed were taken and notations made on them as to the owners and figures given as to actual operating costs. Prospects were invited to call these home owners if they wished and to get the owner's word as to the cost of operating. The company went further and prepared an estimate of the probable monthly cost of heating different types of homes.

For a six or seven room bungalow an estimate of $18 to $22 per month was made and for an eight or nine room two story, $24 to $30. (The househeating rate is 48 cents per thousand). Of course these figures were only an estimate for preliminary sales talk. The company offered to make an actual survey of any house where desired so that figures for that particular home could be given.

The company handles several different makes of furnaces and thereby shows no favoritism to any manufacturer. Consequently the good will of the manufacturers as well as the plumbers, tinners and steamfitters has been kept.

At the beginning of the campaign conversions outnumbered outright installations about ten to one. This was in a measure due to the fact that the campaign was directed toward the home owner who of course already had some kind of a heating system. As the campaign progressed more outright installations were made, and they now number about 25 per cent of the heating jobs. Salesmen went after the new house, particularly on jobs where the building contract was for

more than $7,500. In the new jobs, however, it is often necessary to deal with an agent or contractor. The advantage in selling conversion jobs is that the salesman can talk directly to the customer.

In addition to prospects worked up by a house-to-house canvass many direct calls came as a result of a consistent advertising campaign. All the usual advertising media were used, with the newspapers bearing most of the appeal. Direct-by-mail literature was sent out at regular intervals to prospects obtained in the doorbell canvass. Other media included billboards, backs and sides of company trucks and tire covers of company salesmen.

Overcoming Obstacles

In the advertisements the advantage of gas over coal, such as its convenience, control and cleanliness were argued. Coal dealers put up a strong counter fight, contending that gas heat was much more expensive and more dangerous. The gas company paid no attention to the opposition, on the assumption that its campaign must be getting results or coal interests would have taken no cognizance of it.

Obstacles to overcome were not so much opposition from coal men but the rather cold reception to gas heat at the beginning of the campaign. It was a new system and one unfamiliar to most people in the city. But the consistent advertising did much to break down this sales resistance.

One of the most unfair attacks on gas heating was put out by an insurance agency which probably intended no harm to the gas company. The agency circularized residents having gas heat soliciting the "explosion insurance." Reproductions of photos where explosions had wrecked houses were enclosed. The company of course did not attempt to answer this letter but salesmen in selling equipment pointed out the safety devices now used on gas furnaces.

What Will it Cost to Heat My Home With Gas?

Since the beginning of the present heating season all of the discussion ...all of the controversy about home heating...has simmered down to this one question: "What will it cost to heat my home with gas?" The following figures, taken directly from our records, provide definite information as to the cost of Automatic Gas Heating Service for the four principal types of Birmingham homes

TYPE OF HOME	CONSTRUCTION	Av. Cost Per Month
6 or 7-Room Bungalow	Brick, Stone, Stucco	$18 to $22
6 or 7-Room Bungalow	Frame	$18 to $24
8 or 9-Room Two-Story	Brick, Stone Stucco	$24 to $28
8 or 9-Room Two-Story	Frame	$24 to $30

There's a definite answer to your question: What will it cost to banish furnace tending forever. .yet enjoy the positive comfort of even, uniform warmth all over the house all winter long? There's proof that Automatic Gas Heating is within easy reach of every family Call 4-5850 for free survey with further accurate data as to the low cost of this care-free heating service for your particular home.

Every Winter's Day a June Day

Birmingham GAS Company "Your Company"

GENERAL OFFICES	ENSLEY OFFICE	BESSEMER OFFICE
317 N. 20th St., Birmingham	604 19th St.	710 19th St., Bessemer
Phone 4-5850	Phone 6-4161	Phone Bess. 396

A sample of the newspaper advertising used

Use of Price Appeal

The price appeal, although not usually used in selling gas heating, was utilized by the company during the summer months when a concession was made on the installation price. Ads carried information as to the special offers with notice that the price would advance on a certain date. Price advances were made May first and September first. This special offer brought in many customers during the slack Summer months and helped to distribute a business that is usually seasonal, over all months of the year.

Conversion burner job installed in Birmingham

The company, however, made a merchandising profit on all jobs and did not take a job alone for the increased gas consumption thus realized. The seasonal increase of gas consumption, however, as a result of the year's campaign totalled approximately 298,000,000 cubic feet.

Sales Terms

Sales of furnaces and burners were made on the installment basis, bills being rendered monthly and including charges for fuel used for cooking or other purposes. Trade-ins were offered on old furnaces where they were not suitable for conversion burners. If the customer had coal on hand and this fact stood in the way of a sale, the company credited the cost of the coal on the price of the new job. The average cost of new furnaces installed was about $485, whereas the average conversion burner job was $210.

Several very interesting facts were brought to light by reason of this intensive selling effort. First, it plainly demonstrated that househeating can be sold, and in sufficient volume to make the proposition attractive. Next, it gave the company a line on what type of advertising and publicity produces the best response, and also showed how much expense and attention should be devoted to each phase of the same. Lastly, it insures easier gas househeating selling in the future.

The Gas Producer

III—Conduction of Gas Producer Fuel Tests

JOHN W. ROMIG

Soot and ash collectors of huge proportions are desirable adjuncts to a good producer gas piping system

IF a producer plant is being started for the first time the wisest procedure to follow is to purchase a fuel close to that specified by the producer manufacturers. After having become accustomed to that fuel, which, of course, should be a good producer gas fuel, experiments and tests may be conducted to compare the results being obtained with results possible with other fuels.

A higher grade fuel may be selected for one or two tests and a lower grade and less costly fuel may be selected for additional tests. When the results have been summarized, decisions relative to the economies of fuel purchases are possible and contracts let accordingly. Testing fuels used for producer gas is by far a more economical procedure than random buying of fuels on the market. A test covering a month should not jeopardize the operation of a plant to any serious extent.

The selection of fuels outside of sizing and preparation is based largely upon the proximity of the fuel supply, as the freight cost of a ton delivered in many instances is equal to or greater than the cost of the fuel proper. Initial cost should not be the prime factor in fuel selection, as frequently the lowest first cost raises total costs by increased consumption and where freight rates are high, fewer tons of a better fuel may actually reduce the costs to such an extent that the better fuel is worth considering in view of more satisfactory operation.

Specifications for Coal

Desirable features to look for in a good producer gas coal include:

1. High fusion ash.
2. High b. t. u. content.
3. Low moisture and ash content.
4. Sizing and preparation.
5. Few fines, dust and dirt.
6. Reputation of fuel as a gas producer fuel.
7. In some processes low sulfur.
8. Price delivered.

The high fusion point ash coal is desirable because incandescent and ash bed troubles are due to ash that fuses at low temperatures. High fusion ash eliminates poking to a great extent and the losses due to poking or inattention. A high heat content fuel, of course, is always desirable, as less fuel can be handled at a lower cost per heat unit to the producers than a low heat content fuel. Low moisture content is desirable because the moisture in the fuel only takes heat from the producer, diluting the gas and creating combustion losses as it becomes highly superheated during combustion. Moisture content in producer gas is not so important when the producer gas is used cold as the moisture condenses; however, freight must be paid on moisture in a fuel.

Low ash content has advantages, in that less ash handling and smaller quantities for disposal result. In some processes a low sulfur gas is required and of course under these conditions a low sulfur coal is necessary. The sulfur content of a fuel indicates to some extent the clinkering difficulties to be expected, as the sulfur is usually in the form of iron pyrites which form a fusible slag. Some of the sulfur probably remains in the slag, but a greater part will pass over with the producer gas.

A desirable property of a producer fuel is cleanness or absence of dirt, dust and very fine coal. Good results are obtainable with coal "over 1 and under 2," but with low fusion ash coals, a fuel passing "over 3 and through 3" round hole screens gives better fuel and ash bed conditions than smaller sizes. A statement from vendors and users of a coal is often of help in making decisions regarding fuels for test work covering the adaptability of a fuel for producer gas.

Price—An Important Factor

Lastly, the price of the fuel delivered is necessary in making comparisons and eliminating possibilities of making tests on fuels that present little if any savings, even if it proved to be 30 percent better than a tested fuel. With such a fuel, carelessness in operation might cause a loss, even if such carelessness is intermittent. First cost is not all-important, but the waste of a ton of $4.00 fuel will allow the waste of a ton of $2.00 fuel and at the same time pay for an additional ton of the $2.00 fuel. It is believed that the 30% figure given above is about the top limit for comparing fuels of the bituminous and anthracite classes. The application may be illustrated as follows: Suppose an existing fuel costs $3.00 per ton delivered, then fuels considered for testing and selling for $3.00 plus 30% of $3.00 or $3.90 or more per ton delivered will be considered too expensive for test consideration, as it is rare that one fuel will be 30 percent better than another unless the standard fuel is of very, very low grade. Of course, fuels cheaper than the one being purchased or the one specified by the producer manufacturer are always desirable to use in tests and often with freight rate advan-

tages will often show profits.

As in all test work, the longer the test period, the more satisfactory are the results. The test period should be long enough so that all producer features can be noted as to gasification, operation, canal and conduit conditions. The effects of a new fuel on the process or processes dependent upon the gas evolved from the fuel must be considered. A test of less than 7 days is not recommended for producer fuel tests and where time permits, tests of 14 to 30 days are preferable.

An interval of at least two to three days or from forty-eight to seventy-two hours should elapse before the starting of a fuel test and the time for taking data. This enables the proper adjustment of the producer and at the same time allows an ash bed from the fuel tested to form in its natural manner. It has been found that approximately 48 hours of continuous producer operation is necessary to allow a complete discharge of ash from thin fire beds; for thick beds greater time is necessary to clear the producer in normal operation. This determination was found when changing from a fuel with a clinkering ash to a fuel with a non-clinkering ash and it was apparent from the characteristics of the ash removed that a forty-eight hour period was necessary to completely rid the producer of the clinkering ash with a fuel and fire bed about twenty inches thick gasifying about 24 pounds of coal per hour per square foot fire bed area.

Therefore, the producer rating, type of producer, and the depth of fuel and ash beds enter into the selection of the safe interval before taking data.

In trying a new fuel, adjustments of air and steam, ash level and fuel bed depth under normal rates of fuel gasification are necessary. These adjustments are made using the eye as a gauge for the operation until it is believed good conditions have been secured. Then a combination of visual analyses of the fuel bed and general operation, together with the results of the chemical analyses of the gas will be the better guide.

Moisture Influence

If the ash is fused excessively and the producer requires frequent working, poking and occasional sledging of the clinkers in the fire, indications point towards a deficiency in moisture with a resultant low bugle or air-steam mixture temperature and too high temperatures in the incandescent bed. As the moisture takes heat from the incandescent bed, blowing more steam will cause a colder incandescent bed and a corresponding decrease in ash bed troubles.

Green fuel bed thicknesses and incandescent bed temperatures are best regulated after the bugle temperatures are established. Results secured with a gradual increase of bed thicknesses are best checked by gas analyses and comparisons of total gas evolved per pound of coal as computed from the ultimate coal analyses. If the ash bed level is too low, a poor distribution of the air-steam mixture throughout the fuel bed results, while if the ash bed is too high, it is difficult to get the desired amount of air through the bed for proper combustion of the fixed carbon in the incandescent bed and the zone depths are limited.

Final adjustments must take into consideration gas quality, quantity and ease of producer operation. If it is very difficult to operate with a certain fuel and other adjustments involving less efficient gasification give a greater ease of operation, it usually gives better satisfaction and sometimes greater overall efficiency to adopt a less efficient operating schedule. It is certain that holes in the fire bed cause a direct combustion loss in the producer, so with difficult fire and ash bed conditions it is evident that losses of considerable magnitude may occur.

Air must be admitted in such quantities that the carbon lost in the ash is small. Low carbon content in ash from a high ash coal may mean more loss than a high carbon content ash from a low ash coal. The figure that must be used as a guide is the weight of carbon in ash per pound of coal as received.

In making adjustments for a strange fuel, the suggested procedure is:

1. Determine approximate bugle temperature.
2. Select by trial ash bed level.
3. Select proper bugle temperature and air-steam proportion.
4. Make changes to extremes to determine maximums and minimums.

When the gas analyses and ash analyses show the best results, begin the test and continue for the period decided upon.

Necessary Testing Equipment

The equipment required to conduct a complete test on a water vapor gas producer is not expensive and should be standard equipment in any plant where one or more gas producers are in operation. Some engineers may prefer modifications to the list of equipment herein selected, but tests conducted have shown the described units as quite satisfactory for test work.

All fuel entering a producer during a test should be weighed. Volumetric determinations are not satisfactory. Either track scale weights, delivery scale weights, or weights secured from a hopper placed upon a half ton or larger scale are satisfactory.

A very essential piece of equipment is a clean platform or flat bottomed bin 10 ft. by 10 ft. approximately, for proper sampling and quartering of the fuel for analysis. The proper selection of fuel samples are very important for accurate test results as the calculations are based largely upon the ultimate analyses of the fuel. A bin holding approximately 2 cubic yards should be provided (and kept covered tightly) for storing fuel samples. Covering is necessary to keep the sample from gaining or losing moisture. Similar equipment is necessary for ash sampling.

Equipment described later is necessary for determination of tar and solids in the producer gas. If such equipment is not obtainable, an estimate may be made without introducing appreciable errors, although the data is of interest with all fuels tested.

A modified Orsat apparatus described later is required to make fuel and gas analyses. An orifice steam meter with a recording device is desirable to measure steam flow. However, if a steam orifice and air injector are used, the use of Napier's formula for steam flow will give accuracy that will preclude the use of a flow meter. Thermometers of known accuracy must be used for measuring the blast temperature, steam temperature, if steam is superheated, and agitator inlet water and outlet water temperatures. If a blower is used to furnish air, the air may be measured by placing a suction pipe (10 diameters the length of the pipe) on the blower suction and air velocities measured with a pitot tube 3 diameters from the blower and of the pipe. Pressures of the gas and the airsteam vapor are taken with common manometers or "U" tubes.

To measure the producer gas temperature, metal encased iron-constantan pyods (thermocouples) and a

(*Continued on page 59*)

The Mechanical Grate

JOHN H. WOLFE

Superintendent, Gas Manufacturing, Consolidated Gas Electric Light & Power Co., Baltimore, Md.

(*Continued from October issue*)

WHEN considering the application of a mechanical grate to a plant, each operator must study the economics of the situation to determine if such an installation is desirable under his particular and local conditions. Here we have the old problem of balancing investment and future operating cost against the present operating costs. Unfortunately, it is difficult to assign money values to some of the advantages of automatic clinker removal, such as reduction in the dust, gas, excess heat, and high moisture conditions which always obtain with hand clinkering. Most of the remaining factors are determinable and the amount of saving can be computed.

Among the factors to be considered are the following:

(1) Is the plant a base load plant, and will the grate or grates under consideration run 100% of the time, or will there be a large percentage of lost time? In this respect automatic grates are like any other piece of labor or fuel saving equipment, in that money cannot be saved if the machine does not operate. A good method of determining this is to plot the daily volumes of gas manufactured for the past year, and to draw under or through these the production line of one or more machines to locate that production line which fits in best with the load line, see example as shown in Figure No. 11. Obviously, automatic equipment will not produce a saving if it operates only on the peak load production and, therefore, it will not justify its installation cost under these conditions unless there are extenuating circumstances. Conversely, an installation to carry the base load will invariably pay for itself in a three to five year period.

(2) What are the fuel characteristics? Is the percentage of ash high and is it difficult to remove, or is it small in amount and friable? Here again, the greater the amount of work placed on the automatic grate the greater the saving, because it will reduce the labor costs proportionately.

An Additional Saving

In this connection another saving is realized, which comes about as follows:

In operating a hand cleaned machine a set balance must be struck which will enable the clinkering crew to remove the ash in a reasonable length of time. Experience has shown that this always results in the use of more steam than is required under automatic grate operating conditions. The use of this excess steam involves the consumption of additional fuel over that theoretically required, because the consideration which we are facing with hand cleaning is not a theoretical one, but a practical one, namely, that of being able to remove the ash and clinker by human strength. The use of this excess steam also produces a wetter gas, which throws an increased load on the condensing equipment.

With reasonable supervision an automatic grate will save fuel because of the more normal gas making conditions which are being constantly maintained. Ash is being removed continually and the fire bed is, therefore, kept open and clean, which promotes proper distribution of the air and steam on the blast and make cycles. The speed of ash removal is controllable and allows of the proper adjustment to maintain low ash or carbon losses. The best hand cleaned operation wastes a large amount of fuel through two sources. First—through natural ventilation through the fuel bed at the time of cleaning and, second—through the admixture of good coke, which is hauled out of the clinkering doors, with the ash, and a portion of which burns while the clean is in progress. These losses are entirely prevented with automatic grates.

The Fuel Question

An item which deserves serious consideration when studying the economy of operation is this—are we using the cheapest form of fuel in the generator which is available in our locality? It has been demonstrated that gas plants can more readily choose the cheapest fuel with automatic grate operation because this equipment eliminates all of the factors which would cause one to decide against a cheaper fuel under hand clinkered conditions. This is because lost time on the set or sets, and higher labor costs for clinkering, are not the controlling factors which they once were. Bituminous coals and high ash, low fusion point local cokes have been used with success in mechanical generators, as witnessed by the annual reports made by the Water Gas Committee, Technical Section, of the American Gas Association.

(3) What are the unit costs per man hour for clinkering labor, and is this type of labor readily obtainable? In some localities the laborer, because of high living costs, must earn a higher wage in order to live decently. This fact will, of course, make the labor saving item, when automatic grates are installed, larger than if the unit labor costs are low.

As regards the type, it is, of course, recognized by water gas operators that a good healthy and husky specimen of manhood is required in order to carry out the job of clinkering with speed and accuracy. No weaklings here, otherwise a high labor turnover is the net result, with its consequent losses on account of training cost and wasted materials.

Even if the unit labor costs are low, and it is a relatively easy task to secure the right kind of clinkermen, the intermittent nature and semi-skilled character of the clinkering job make it difficult to secure satisfactory efficiency in utilizing the standby labor or excess labor time. More waste exists in this respect than is ordinarily recognized, and it requires close study to develop it.

Another item which must be considered when discussing the labor cost, is the lost time, due to sickness

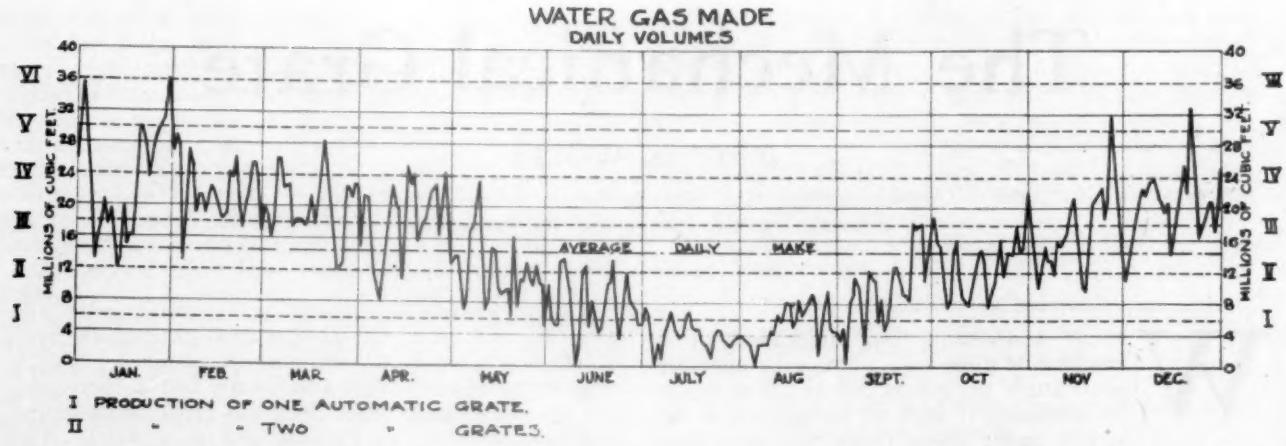

WATER GAS MADE
DAILY VOLUMES
MILLIONS OF CUBIC FEET
AVERAGE DAILY MAKE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG SEPT. OCT NOV DEC.
I PRODUCTION OF ONE AUTOMATIC GRATE.
II " " TWO " GRATES.

Figure 11. Daily water gas production curve. Production Capacities of one to six automatic grates are shown on dotted lines I to VI respectively

of the clinkermen. These men, working as they do, under extremely hot, gaseous, dusty and humid conditions, are particularly prone to respiratory infection, and serious illnesses oftimes result. This is caused by the sudden change from an overheated condition, when the pores are open and the clothing is saturated with sweat, to the cold winter air. Some might classify this as a minor consideration, but no question which involves the health of the worker can, for humane reasons, be called minor.

(4) Is additional plant capacity required? If this is the case, a careful study will, in the majority of cases, prove the wisdom of installing an automatic grate. It has been found in every case that, in addition to saving the clinkering time and adding this to the gas making period, an actual increase in production per running hour has been obtained. Capacities of six to seven million cubic feet of gas per day have been secured with eleven and twelve foot grates, these results being obtained with only fair grades of fuel. The net result of securing capacity by means of a mechanical grate installation is that a large investment charge is averted, because the present land, building, fuel handling and storage equipment, auxiliaries, such as blowers, exhausters, et cetera, are worked a little longer and, therefore, more efficiently from an investment standpoint, the cost of duplicating them being saved. To anyone who is accustomed to the old, hand clinkered, intermittent method of operation a study of the new automatic scheme, with its continuity of operation, will be a surprising revelation of modern methods.

New Operating Costs Involved

(5) What new operating costs are involved? Under some conditions, a slightly higher set maintenance cost may be expected with present grate designs. The manufacturers are awake to this problem and are endeavoring to overcome the defects which now exist. Another item which is negligible is the consumption of power for driving the grate. As this is limited to the current consumption on a partially loaded 5 to 7½ horse power motor the small cost involved can be readily computed. A third item is one which can usually be turned to good account, namely, the production from the grate, of hot water or steam, as the case may be. The hot water may be utilized as preheated boiler feed water, and the heat thus conserved, while the steam may be used to augment the plant steam supply, thus providing additional capacity with no expenditure for boiler plant, labor or fuel. This low pressure steam may be made to do useful work through low pressure turbines on various plant auxiliaries, after which it can be used at reduced pressure for gas making purposes.

Operation

In considering the operation of the mechanical grate it must be realized that we have installed a machine to perform certain arduous duties for us and, since it is a machine, it requires intelligent and regular inspection, attention and care. Overloads and abnormal conditions cannot be placed upon the mechanism because it has definite physical limitations. Nor can such small but important things as lubrication and periodic cleaning be neglected. To supervise all of this a slightly different type of personnel is required from the old "gas house terrier." The operator of the mechanical grate should "know his machinery," otherwise breakdowns and interruptions will be the result of his neglect and abuse. So much for the mechanical or machine side of the operations.

The chemical side has already been briefly referred to, but will be further elaborated upon here. In order to oxidize or reduce carbon efficiently, the proper time and uniformity of contact under the correct temperature conditions must be secured. Consider the two extremes as represented by the hand cleaned set and the mechanical grate.

With the hand cleaned set, the optimum conditions for effective production are present just after the fire has been cleaned. The fuel bed is open and uniform in density, it is at its maximum depth, and as a result the distribution of air and steam are uniform, and high B. t. u. generator and blue gases are produced. As time elapses clinker and ash begin to accumulate. Hard masses of clinker, through which no air or steam can pass, are formed, and as a result the distribution of air and steam are distorted. As the ash accumulates the fuel bed becomes thinner and thinner, and the aggregate result of the distortion of air and steam distribution, and of the thin fire, is wasteful operation, as evidenced by low B. t. u. generator and blue gas and high fuel and steam consumption.

To the above must be added the wasteful effect of over wetting or cooling of the fire by the use of excess steam, so that the resultant ash and clinker can be removed by human strength, and within the limits of human endurance.

In opposition to this the fuel bed of a mechanical grate is always clean. Just enough ash is carried on the grate to protect the grate mechanism from excessive heat, which is also advantageous—in that a regenerative effect is obtained from the heat stored in the ash by the back or down run gases. This heat is later imparted to the blast air and up steam, thus conserving the heat in the fuel bed. The ash is of a uniform texture, having been broken up by the movement of the grate, and as a result it offers little resistance to the passage of air, steam and gas, in fact it aids in their distribution. Above this layer of ash the fuel bed is uniform in texture and is maintained in this condition by the agitation brought about by the moving grate or beam. Higher blasting and steaming rates can be employed as a result, since efficient contact is maintained at all times, and any tendency toward blow holes or channeling is instantly corrected by the fuel movement. Because of the small uniform layer of ash, the fuel bed is always at its maximum depth, and as a result large quantities of high B. t. u. generator and blue gases are produced. The quantity of steam used, as compared to the quantity of air employed, may be reduced because clinker formation is impeded by the movement of the fire. This relation is sometimes expressed as the "air steam ratio." With hand cleaned sets this ratio must be kept below 28 cu. ft. of air per pound of steam, otherwise the fires will "clean too hard." With the automatic grate this ratio can be raised to 30, or even 32 cu. ft. of air per pound of steam, with resultant improvement in steam decomposition and fuel economy.

No consideration will be given in this paper to the merits claimed by the manufacturers of various types of wall construction, as regards the prevention of side wall clinker on generators equipped with automatic grates. In the experience of the writer, the solution does not lie in the wall construction, but in the distribution of the air, steam, and gas through the fire, coupled with intelligent handling of the proportions of up and back, or down steam, and the use of the proper air steam ratio. The writer does believe, however, that more liberties can be taken in operating grates that are water jacketed. The cost of taking these liberties is, however, unnecessarily high and it would seem that the ends of economy could best be served by closer adjustment of the operating cycle and closer control of the air and steam quantities.

Effect of Fusion Point of Ash

Experience has indicated that the location of the clinker zone can be controlled primarily by varying the proportions of up and down or back run steam. With the high fusion point ashes, say those ranging from 2650° to 2750°F., the back run or down run portion of the run cycle may be as high as 70 to 75 per cent of the total steam input by weight. The other limit is illustrated by the 2150° to 2250° F or low fusion point range, generally high iron and lime ash, in which case the back or down run portion may be reduced to 40 to 45 per cent of the total weight of steam per cycle.

Oil Results

A study of the effect of the greater uniformity and higher quality of gas produced by the mechanical grate on the oil results, brings out some interesting details. To one accustomed to operating a hand cleaned set, the close adjustment of the percentage of oxygen in the blast products would seem to be a relatively unimportant matter and having no connection with oil results. This is natural because in hand cleaned sets a completely and exactly burned blast gas does not materially affect the condition of the checker brick. These bricks are scurfed clean by air drawn in by natural draft at each cleaning period. No such scurfing takes place with a mechanical grate, so that it is extremely important, if satisfactory oil results are desired, to carry the burned blast gases always on the oxidizing side so that the checkerbrick may be scurfed on each blasting cycle. The writer can say from experience, that if this continuous scurfing is not practiced, carbon will be deposited in the checkers, oil results will suffer, and the checkers may actually be burned up the first time that the set is taken out of service as a result of concentrated scurfing during one long interval with natural draft. Lack of attention to this small detail may be the explanation for the reduction in oil efficiency experienced at several plants which have installed automatic grates. This reduction is all the more serious when one realizes that it is actually greater than it apparently is, because the blue gas quality from the automatic grate is without any doubt far better than that produced on hand cleaned sets. A good average value for the former would be from 290 to 300 B.t.u. per cubic foot, while for the latter an average of 265 to 275 B.t.u. is far better than that usually obtained.

Use of Heavy or Bunker Oils

While on the subject of oil, an interesting application of the use of heavy oils has been reported recently. In this process all or a major portion of the oil is sprayed on the generator fire, the thought being to distill the oil by the heat in the top of the generator fire and to consume as generator fuel the high percentage of carbon contained in the oil. It is understood that tar is also being used in this manner. The writer believes that, because of the marked superiority of the mechanical grate in maintaining uniform generator fire conditions, the application of heavy oils and tars will produce increased economy when used in conjunction with this equipment.

Reforming of High B.t.u. Gases

There has been at least one application of the automatic grate to the reforming or breaking down by pyrolysis of high B.t.u. gas, in this case oil gas purchased from an oil refinery, into gas of lower B.t.u. content. This is accomplished by passing the high B.t.u. gas down through the fire and thus subjecting it to destructive distillation and over cracking. In this process, carbon is deposited in the fuel bed and both the gravity and B.t.u. of the heavy, high B.t.u. gas is reduced. A wide range of both gravity and B.t.u. of the resultant gases is obtainable by varying the proportions of the high B.t.u. gas cracked and that used for cold enrichment. Further control is obtained by varying the percentages of blow and purge run. The important point in this process, insofar as the generator is concerned, is to operate on the safe side of the critical point and to remove sufficient carbon from the generator fuel bed on the blasting cycle so that a cumulative deposition of carbon does not eventually plug up the fire by cementing together the fuel particles. While this process reduces the ash removal load on the automatic grate, the agitation and conditioning of the fuel bed brought about by the grate movement is a vital factor in maintaining satisfactory economies.

Soft Coal

Two mechanical grate installations have operated successfully with soft coal as generator fuel. It is remark-

able that these two plants use such totally different methods of operation. One operator secures good results by filling the generator to the charging hole, while the other carries a very thin fuel bed which is cup shaped in section, the fuel being charged against the generator walls.

Because of the low ash content of most of the bituminous coals used in making water gas, the fire movement must be reduced, or even interrupted, otherwise too much carbon will be carried through with the ash. It has also been found that, while some agitation of a soft coal fire is good, too much is detrimental to good results, particularly if the coal is one which is plastic or gummy over a wide temperature range.

The reduction of fire movement, because of the decreased ash removal load, in addition to being beneficial to the fuel bed conditions, also reduces the amount of fuel carried over with the up run and back run because the period of fire movement is confined to the blasting period. This assists in reducing the amount of dust and fuel deposited in the carbureter, superheater, washbox and back run pipe. Some operators also insist that tar emulsion troubles are reduced to a remarkable degree by this cessation in fire movement during the run.

The same general requirements must be observed in purchasing and utilizing soft coal in automatic grates, as on hand cleaned sets, except that a higher percentage of ash is not detrimental to automatic grate operation, because of the ash removal load, with soft coal, even with a high percentage of ash, is usually much lower than with coke. The coal should be large and of uniform size and thoroughly screened before charging into the generator if increased and high capacities are desired and the best results are required.

(Continued in January issue)

Report on Research in Scaling of Steel At Forging Temperatures now Available

RESULTS of the third part of the program of research in the application of heat to forging sponsored by the Committee on Industrial Gas Research at the University of Michigan are now available in printed form. A thorough discussion, based on a year's laboratory research and field work, was presented on behalf of the Committee at the recent annual convention of the American Society for Steel Treating by Messrs. W. E. Jominy and D. W. Murphy of the Department of Engineering Research of the University of Michigan.

The relative scaling action of air, steam, carbon dioxide and oxygen on steel at 2000 to 2500 degrees Fahr. is presented in this paper. In addition, the effect on scaling of time of exposure, of rate of flow of the scale producing gas, and of variation of temperature is given. It is shown that the rate of scaling decreases with the time of exposure and increases with the temperature. Of special interest is the finding that increasing the rate of flow of the gas above 50 feet per minute has practically no effect on the rate of scaling. Between zero and 10 feet per minute, the rate of flow has a very pronounced effect, the slower the rate, the less the scaling.

The importance of reducing or eliminating the scale resulting from heating forgings is receiving considerable attention in metallurgical circles. The authors draw, among others, the following conclusions:

1. Increasing the rate of flow of the gas between 0 and 2 feet per minute causes a very marked increase in the rate of scaling at 2500 degrees Fahr. With air or carbon dioxide, relatively little change in the rate of scaling is produced by increasing the rate of flow from 2 to 10 feet per minute. With these gases no change is produced with rates of flow higher than 10 feet per minute. In the case of steam, a noticeable increase in the rate of scaling occurs with the increase in rate of flow from 2 to 15 feet per minute, and a very small increase in scaling rate up to 60 feet per minute, after which increasing the rate of flow has no effect on rate of scaling.

2. Increase in temperature causes increase in scaling rate. Between 2400 and 2500 degrees Fahr., the scaling rate increases sharply. When heated to 2375 degrees Fahr. in nearly pure oxygen, ordinary plain carbon steel oxidizes so rapidly that it is melted by the heat liberated in the chemical reaction with oxygen. When heated to about 2425 degrees Fahr. in air, the steel becomes hotter than the furnace atmosphere, but does not liberate enough heat to melt a low carbon steel.

3. Increase in time of exposure causes increase in the amount of scale produced, but decrease in the rate of oxidation.

4. Scale on steel acts as a partial protection against further scaling. The type of scale formed has a decided influence on the further rate of scaling.

5. Under the conditions obtaining in this research the average iron content of the scale formed with air approaches that of Fe_3O_4, and the average iron content of scale formed in carbon dioxide or steam approaches that of FeO.

Copies of this report on scaling can be secured by addressing the Secretary, Committee on Industrial Gas Research, American Gas Association Headquarters, 420 Lexington Avenue, New York City.

Parts I and II of the foregoing research consisted of studies of overheating and burning of steel at forging temperatures. Copies of the reports covering these previous researches are also available.

Silk Made From Natural Gas

THE manufacture of artificial or cellulose silk from natural gas is made possible as the result of a discovery recently reported by Prof. Harold Hibbert of McGill University. Carbon dioxide and water are the basic materials used in the new process.

Carbon dioxide is a by-product of the combustion of natural gas. The making of sugar from carbon dioxide and water was discovered in England some time ago. Prof. Hibbert has gone a step further and converted the sugar into cellulose, paralleling the steps taken by nature in the growing plant and tree.

The department of information of Appalachian Gas Corporation, in commenting on the discovery, pointed out that while none of their customers are now using natural gas in the new process of artificial silk or sugar manufacture, that when the new method is reduced to a commercial basis, it will not only add another new use to the 23,000 already known uses for natural gas, but should develop an entirely new market for many million cubic feet of natural gas annually.

Automatic Control of Gas Mixing

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THE correct mixing of two or more complex gases, such as natural gas and manufactured gas, for example, into a distribution system or storage holder can be accomplished manually if unfailing care is exercised by the operator and if sufficient instruments and records are furnished and utilized. It is necessary, however, to watch rates of flow, pressures, and temperatures, as well as B.T.U. variations of the gases being mixed. The inherent time lag of present calorimetric devices has been a handicap to the satisfactory mixing of gases by hand or automatically.

The demand for the automatic mixing of gases to maintain a uniform heating value has brought about the development of a heat measuring instrument having practically instantaneous response to changes in B.T.U. of the gas. This instrument may be rightfully termed the "voltage regulator" of the gas industry. This rapid response to changes in B.T.U. of the gas is utilized in the automatic mixing of gases to maintain the desired uniform heating value of the mixture.

Principle of Instrument

The new gas mixing controller or "Calorimixer," shown in Fig. No. 1, consists essentially of a water tank somewhat similar but smaller than the Thomas recording calorimeter tank, in which is immersed an air pump and a gas pump geared together and driven by a motor with a worm reduction quite similar to the Thomas calorimeter. The gas pump is almost identical with the gas pump of the recording calorimeter, but the air pump is somewhat different in that it is made up of sections and the number of sections used depends upon the class of service for which it is to be used. For controlling a mixed gas within the range of 400 to 600 B.T.U. this heat absorbing air meter would have two such sections, whereas in plants where the heating value of the mixed gas is to be within 600 to 800 B.T.U. this meter would have three such sections.

These pumps are shown removed from the tank in Fig. No. 2. A sample of the mixed gas is brought to the mixing controller, part of which is burned in a bleeder burner at atmospheric pressure and the remainder is pumped through the gas pump to the burner where it is burned in the heat absorbing air. In this respect the gas mixing control is different from the Thomas calorimeter and probably more nearly gives an indication of net heat instead of total heat. A thermo-couple is installed just after the point of combustion of the gas and indicates the temperature due to the combustion of the gas. This thermo-couple has a very small mass and gives practically an instantaneous response to changes in temperature of combustion or heating value of the mixed gas.

Figure 1. C-H Gas Mixing Control Unit with Standard Control Panel

A pyrometer controller is set for the desired temperature or heating value of the gas and this instrument then operates a motor driven butterfly valve through adjustable interrupters to take care of the particular needs of any installation. The pyrometer controller, the terminal board, signal relays, battery for alarm bell, and re-ignition transformer are all mounted in a section of the controller tank. This section is equipped with a door and a lock. On top of the tank are pushbuttons for manual operation of the butterfly valve or for cutting the controller out of service. There is also a button included for testing the bell at intervals to make sure that the batteries and bell are in working order. Signal lights on the top of the tank indicate when the unit is operating and also indicate when the butterfly valve has reached its limits.

Adaptability to Thomas Calorimeter

This gas mixing controller was designed originally to be used in connection with a Thomas recording calorimeter. A small motor driven adjusting mechanism is attached to the Pyrometer controller which can be very easily connected to contacting discs on a standard Thomas calorimeter. This will give automatic adjustment of the gas controller so that the ultimate value of the mixed gas will be the result of the accurate measurement of the calorimeter. When used in this manner the two tank units are connected together, by small pipes, which arrangement maintains the water level in the gas mixing controller tank.

Due to the design features of this calorimixer, wherein the units are immersed in a tank of water, very stable operation is obtained over long periods of time. This unit can be used without Thomas calorimeter supervision and it will maintain the heating value of the mixed

gas within about plus or minus 2 percent over fairly long periods of time without the necessity of adjusting or checking this setting. In general, however, it is desirable to have a recording calorimeter on the gas system at some point where an accurate measure of the total heating value of the gas is obtained. When the gas mixing control unit is used without the calorimeter, a small water level controller is furnished, which necessitates a small amount of running water and a drain connection.

Control is Fool-proof

This gas mixing control unit has been built up around the well known and tested principles of the Thomas recording instrument. It is practically fool-proof and is more automatic than the standard calorimeter in that it has a relighting device which starts operating in 15 seconds after a burner failure or a power failure. Also incorporated in the device is the alarm signal to give notification of any power failure or interruption to service of the equipment.

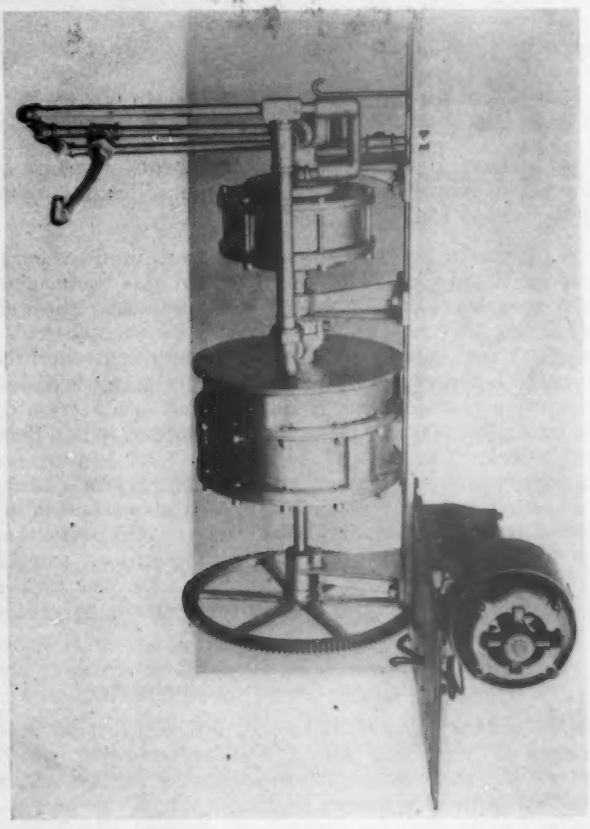


Figure 2. Tank unit of C-H gas mixing controller

In addition to the application of the Calorimixer for artificial gas mixing, it has found acceptance in connection with the use of liquid butane as a cold enriching agent or for small towns where the butane is diluted with inerts to form the entire gas supply. Fig. No. 3 shows an installation where butane is automatically used to enrich water gas at a point between the relief holder and the storage holder.

A great number of small butane gas plants have recently been installed in small towns of 5,000 to 10,000 population; the Calorimixer makes it possible for these plants to be entirely automatic. There are two general types of these butane air mixing plants at the present

Figure 3. Installation of C-H Calorimixer used for enriching blue gas with butane

time: (a) direct-line mixing (holder bypassed); and (b) mixing through storage holder.

The direct-line mixing type of plant consists essentially of the customary butane tank and heat exchanger with the necessary pressure regulators and automatic mixing equipment to mix butane with air which is pumped by one, two, or three compressors directly into the distribution system. In this type of plant one or more of the compressors runs practically all the time and maintains a definite pressure in the distribution system. A high pressure holder simply floats on the line and mixed gas is pumped as required into this holder automatically by pressure control. The storage holder is simply used as a reserve supply.

Additional Applications of Calorimixer

The second type of butane-mixing plant consists of the similar butane tank, heat exchanger, pressure regulators and automatic mixing equipment, but differs from the first type of plant in that all of the mixed gas is pumped at high pressure directly into the storage holder. The compressor and the entire plant is started and stopped from high and low pressure limits of this storage holder.

Another application of the Calorimixer is for controlling the re-enriching of a high pressure gas at the remote end of a distribution line. Generally pentane is used for this purpose at the outskirts of a small town which is served by the high pressure line from another town some distance away. The enrichment in this case is only sufficient to take care of the drop in B.T.U. due to the compression and cooling of the gas in the distribution line. The Calorimixer automatically controlling a needle valve in the pentane line insures a uniform quality of gas to the town regardless of distribution temperatures and pressures.

The Use of Butane For Increasing Production During Peak Loads

WHILE the word Butane is, to a certain extent, a misnomer, it is commonly applied to the commercial mixtures of the various liquefied hydro-carbons obtained in the extraction of gasoline from natural gas.

These liquefied hydro-carbon mixtures contain various amounts of ethane, propane, isobutane, butane and pentane. The ethane and pentane, however, are highly undesirable in any fuel in which our industry is interested at the present time. In the rectifying process these are readily segregated, the ethane being returned to the gas and the pentane being used in the production of gasoline. Thus a clean cut mixture of propane, isobutane and butane can be supplied to the industry, and the amounts of the three ingredients can be varied at will to maintain practically any boiling point or vapor pressure required by varying climatic conditions.

Plentiful Supply

There appears to be no question regarding a plentiful supply of this material for years to come, and the facility with which it can be converted to a commercial gas demands the attention of the gas industry, and incidentally that of anyone interested in the marketing of other fuels or electric energy, where such is used as a source of heat or light.

The extremely low installation and operation costs of plants for the conversion of this material to a usable gas, either pure, with a B.T.U. content of about 3200 per cubic foot, or mixed with air to obtain any desired B.T.U. below that point, renders possible the serving of gas to communities formerly so small, or so isolated that gas service was impossible. Even with the present wide divergence between the prices charged for fuel oil and for these liquefied hydro-carbons, small oil gas plants, possibly up to 100,000 cubic feet daily, can profitably be supplanted by plants producing a Butane-air gas normal B.T.U. value. This is due to the fact that in small plants, the labor, upkeep, overheads and fixed charges per unit of gas produced are so greatly in excess of similar charges in a larger plant, that the increased fuel cost in producing a Butane-air gas will be more than counterbalanced by the saving in labor and miscellaneous expense.

As plants become larger and larger, the cost of fuel becomes more and more dominant in setting the cost of gas production. Hence, any fuel to supplant the present low priced oil used by the oil gas industry must, in a plant of any considerable size, be reduced far below that which we can hope for in the case of these hydro-carbon compounds.

It would be well for the gas industry and the producers of these materials to cooperate in a thorough study of the needs of the former, and the ability of the latter to supply those needs. Such a study would no doubt be of mutual benefit to both parties, in promoting the use of the material, particularly, perhaps in the immediate future, by the smaller manufacturers of oil gas, in more remote locations.

Your committee suggests that such cooperate study be instigated by our Association at once, in an effort to establish a more equable comparative cost and a more satisfactory freight rate in order to relieve the burden of high production costs from some of our smaller member companies, located far from producing centers. While all of the foregoing is somewhat aside from the subject assigned to this committee, we feel that the part to be played by these liquefied hydro-carbons, in the manufactured gas industry in the near future is of great importance, and it is our desire that our Association be not backward in aiding in the progress of this development. Hence, we feel that our digression, in order to put this thought before our Association, is justified.

Hereafter the word Butane will be used for the sake of brevity, in its commonly accepted form, as designating any commercial mixture of the three desirable ingredients; propane, isobutane and butane. The possibility of the cost of butane being lowered to a point where it can supplant fuel oil as a basic fuel for gas manufacture in any considerable volume, is very remote, and more particularly so where other manufacturing processes are already installed.

But even with the present high initial cost and excessive transportation charges, the use of butane to increase plant capacity over peak load seasons offers great possibilities to our industry, whether we are large or small manufacturers. A lean manufactured gas can be readily carburetted by the addition of butane vapors to any desired calorific power, the lean gas offering direct savings in fuel costs and increasing the capacity of generating units by increasing the gas per unit of fuel used. The carburetion in itself is 100 percent efficient. The Tucson Gas and Electric Light and Power Company of Tucson, Arizona, was this year faced with the problem of increasing plant capacity for the coming winter, in the face of the possible early advent of natural gas into that territory. The estimated cost of oil gas apparatus for the desired increase was $50,000. This apparatus would be required for a very small portion of the year, but would entail a constant carrying charge and upkeep expense.

Low Cost System

After experimentation in the carburetting with butane vapors, of a 400 B.T.U. gas to 500 B.T.U., their standard, they installed a carburetting system at a cost of about $3,000, or one sixteenth of the cost of the proposed oil gas apparatus.

With oil at $2.52 per barrel and butane at about $.10 per gallon the increased cost of gas is about $0.04 per M for a short period of the heavy load season.

The carrying charges on the $50,000 capital investment would be very considerably in excess of the total increased cost of gas during the year.

Tucson reports that the lowering of the calorific power 100 B.T.U. results in a saving of 1.5 gallons of oil per M, and requires the addition of one gallon of butane per M of finished gas; has increased the generating capacity 30 percent; has created more satisfactory operating conditions by eliminating the production of tar, and the necessity of cleaning scrubbers, washers, offtakes, etc., with a consequent reduction in labor and miscellaneous expense, which in a plant of that size, will go far toward counter-balancing the additional $0.04 fuel cost per M.

Preliminary report of committee—C. H. Webber, F. M. Cota and J. A. Harritt, Chairman—presented at Pacific Coast Gas Association Conference, San Francisco, Nov. 21, 1930.

Mr. Webber, Supt. Gas Department at Tucson, further reports that the production of lampblack has decreased approximately 30 percent. This furnishes a very interesting subject for further consideration as the lowering of the calorific power of oil gas has always heretofore resulted in an increase in the amount of lampblack produced, in direct ratio to the increase in the hydrogen content of the leaner gas, despite the efforts of the industry to convert it to carbon monoxide.

The average specific gravity of the 500 B.T.U. oil gas at Tucson is .34, while that of the lean gas is .29. The addition of one gallon of butane, or approximately 32 cubic feet of butane vapor per M results in a gas of .35 specific gravity and 500 B.T.U.

The generators at Tucson are of the straight shot upblast type.

A similar, smaller plant at El Centro, California, used this method for increasing production during the past winter, and while we are not as yet entirely conversant with the results obtained, they are believed to have been substantially parallel to the results obtained at Tucson.

A ten-day test was made at the San Diego plant last August, along somewhat the same lines, but with different objects in view, and on a different type of generator, viz.: the Jones' improved sets of 5,000,000 cubic feet daily capacity.

The primary object of this test was to determine the quality of gas which could be most economically produced by this type of apparatus, which appears from our experience during the test to be between 510 and 520 B.T.U. whereas the experience at Tucson points to increased economies obtainable far below that value.

The San Diego test with an average of 508.3 B.T.U. in the lean oil gas, and the addition of .44 gallons of butane or 14 cubic feet of butane vapor, resulted in an increased capacity of 10 percent per unit of oil used. The improved operating conditions indicated that the generators could safely and economically crack at least 10% more oil than is normally considered a safe load, thus increasing the safe net yield by 21 percent, with further reserve for short peaks. The increased cost of gas, based on fuel costs only, during the 10 days of experimental operation was $0.019 per M of finished gas of 550 B.T.U. This cost is based on a tentative quotation of 6 cents per gallon of butane.

Improved operating conditions, due principally to the decrease in tar produced, with a consequent decrease in congestion and miscellaneous labor and other expense incidental thereto, would partially balance the increased fuel costs, in an amount which could not be determined under short periods of operation.

The specific gravity of the finished gas averaged .47 as compared with oil gas at .48. The increased hydrogen in the lean gas more than counter-balanced the heavy butane vapors, which in the San Diego tests were of 1.85 specific gravity. The experience at San Diego has resulted in the contemplation of the installation of butane storage and carburetting equipment in 1931, whereby the plant capacity during the peak season will be increased approximately by 20 to 25 percent.

A Substantial Saving

The estimated cost of this installation is about one-tenth of that required for oil gas apparatus for the same increase and practically all of it for storage of butane.

The saving in plant carrying charges will be about $13,500 annually, which is far in excess of the increased cost of a carburetted lean oil gas during peak loads, which might occur during the coming winter, or perhaps during the peak season of the next two or three years.

Tucson, El Centro and San Diego are the only oil gas plants, so far as we know, which have experimented with butane in connection with oil gas manufacture, and the method has been confined to the injection of the vapor into the lean oil gas.

The San Diego Company in its recently acquired plant at Oceanside, is installing a butane-air gas apparatus to augment the supply of oil gas. This presents an entirely different problem, as the butane-air gas of 550 B.T.U. will be 1.15 specific gravity and therefore its admixture to the oil gas must be limited. A separate vapor line will be provided for the cold carburetion of lean oil gas, so that the system will be extremely flexible and further additional capacity will be obtained by the use of the combined methods, the carburetion of air and the carburetion of lean oil gas. This plant will be installed at about one-fifth of the cost of oil gas apparatus of equal increase, but will be of twice the capacity of the present oil gas plant, if operated continuously.

The total cost of the butane-air gas will be about 60 percent of the present cost of oil gas, and the fuel costs of carburetted oil gas will be about $0.02 per M above present costs. It is very probable that in this plant, the increased capacity due to butane will result in lower costs of production than are at present obtained with straight oil gas.

Conclusion

The study of this subject, so far as it has progressed, clearly indicates that for peak load conditions, butane is admirably adapted to the needs of the oil gas industry.

Carburetion apparatus can be installed at an insignificant cost, of sufficient capacity to enrich large volumes of lean gas.

Storage capacity for butane is the only real item of expense and must be governed by the amounts required and the reliability of transportation.

Savings in the basic fuel in producing a lean gas, and the many economies obtainable elsewhere in the plant operation under this method, partially at least, counterbalance the apparent increase in fuel costs.

From 20 to 30 percent increased capacity is readily obtainable with an initial investment of approximately 10 percent of that required for oil gas apparatus.

Increased fuel costs will vary greatly according to size and location of plant, degree of carburetion desired, comparative costs of the two fuels and many local contributing factors.

It is probably safe to assume that the maximum range, in the oil gas area, has been reached at Tucson, with an increased fuel cost of $0.04 per M.

With that figure as the probable maximum increase in cost, for a few weeks per year, it is apparent that our industry should seriously consider butane as a solution of the vexatious peak load problem; even at the present unequable costs, and attempt to reduce these costs by the increased use of butane, until it becomes, not only a substitute fuel for peak loads, but a base fuel for our small plants.

XVI-The Gas Refrigerator

THE romance of cold from heat as we have become accustomed to consider the gas refrigerator for the past few years is quite old. A gas refrigerator was made and operated many years ago in which gas supplied the heat needed to carry out the absorption system of refrigeration. However, as has been so often the case, this innovation was far ahead of the demand and mechanical household refrigeration was to be delayed until the commercial success was brighter. In general, refrigeration is the production of cold or the elimination of heat. When ice is used, it cools by melting which process take place without change in temperature of the ice itself but with relatively great absorption of heat from the surroundings which in turn undergo a temperature drop. The heat taken up in melting one pound of ice at 32°F is 144 B.t.u. or enough to cool 10 pounds of water from 60°F to almost 45°F.

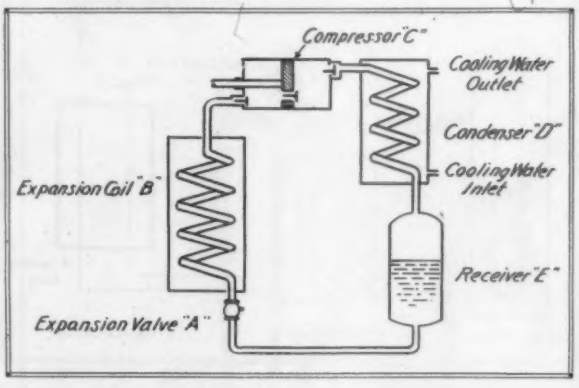


Figure 1. Diagrammatic sketch of a compression system

Melting or fusion is not the only physical process by which heat is extracted from surroundings, with subsequent cooling, but any change in physical state in the direction of a less dense form acts in the same way. In addition to melting, these changes are boiling and evaporation, sublimation and dehydration. Of these boiling and evaporation are the processes causing changes in physical state which are best adapted to mechanical operation. Evaporation is assumed to include not only the change from the actual liquid state to a gas but also the change brought about by releasing pressure on a highly compressed gas and permitting expansion.

To carry on the mechanical process of refrigeration there must be a substance capable of easy change from the liquid to vapor state, commonly called the refrigerant. Were there an unlimited supply of the refrigerant or means of easily renewing this as when ice is used, producing cold would be simply a case of permitting evaporation to continue. However, a refrigerating machine actually takes the substance which has lost its power of extracting heat from the surroundings and revivifies the spent refrigerant making it again capable of producing cold. As far as the production of cold is concerned the mechanical refrigerator is only a container in which evaporation takes place. Its principal function is to change the gas back to the original liquid so that the process can become a continuous cycle. The method of carrying out the return process determines the name given to the refrigerating system. Gases can be changed to liquid by compressing and reducing the temperature. If this means is followed, the system is called "compression." The compression system uses a compressor to create enough pressure to liquefy the gas.

Compression System

In the accompanying diagrammatic sketch, Figure 1, the parts of a compression system are clearly evident. This is divided into the two portions, the refrigerating unit and the reconditioning machine. The unit consists of the expansion valve "A," and the coil "B," which extracts heat from the surroundings. The reconditioning machine is made up of a compressor "C" to produce a sufficient pressure for subsequent liquefaction; the cooling unit "D," to lower the temperature of the compressed gas and finally cause liquefaction and the receiver "E" to store and maintain the necessary quantity of the liquid refrigerant.

The simplicity of refrigeration is evident, the entire equipment consisting of an expansion valve and heat exchanger. The reconditioning machine, however, uses a compressor, a cooler and receiver, all more or less complex according to the design of the refrigerating machine. As it is impractical to use gas for driving the conventional compressor, further description of commercial compression machines can be neglected.

Absorption Systems

A second method of changing a gas to a liquid is to dissolve the gas in a suitable solvent and subsequently evaporate it from the solvent. This rapid evaporation into a confined space causing increased pressure combined with external cooling converts the refrigerant to the liquid state, from which it can again change to a vapor creating cold. The important step in this method is the absorption of the gas by the solvent. For this reason systems operating on this principle are called "absorption."

The absorption of the refrigerant not only is the method of starting the liquefaction of the refrigerant but also helps in the evaporation of the liquid by creating a partial vacuum.

Absorption type machines can be divided into two

groups: the continuous flow machine and the intermittent flow machine.

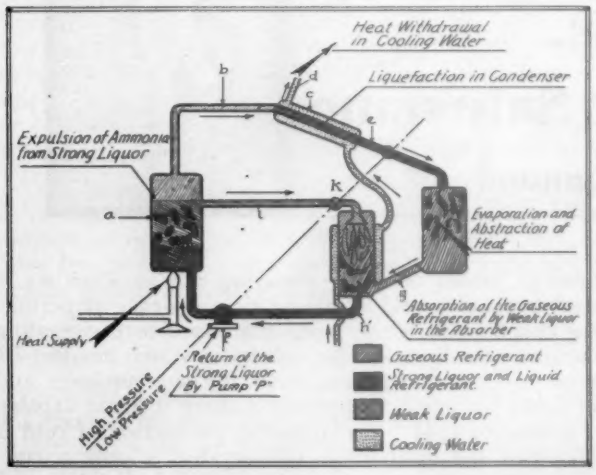

Heat Withdrawal in Cooling Water
Liquefaction in Condenser
Expulsion of Ammonia from Strong Liquor
Evaporation and Abstraction of Heat
Absorption of the Gaseous Refrigerant by Weak Liquor in the Absorber
Heat Supply
Return of the Strong Liquor By Pump "P"
High Pressure
Low Pressure
Gaseous Refrigerant
Strong Liquor and Liquid Refrigerant
Weak Liquor
Cooling Water

Figure 2. Diagrammatic sketch continuous flow absorption machine

The principle of any continuous flow absorption machine is shown diagrammatically in Figure 2. This can be divided into the refrigerating unit (which is the same as in the compression system) and the reconditioning unit. The liquid ammonia evaporates through the expansion valve "A" into the coil "B" which extracts heat from its surroundings and passes to the absorber "C," where weak liquor absorbs the vapor. The strong liquor made in this way is pumped back to the generator "E" by pump "D." A constant level is maintained in "E" since the weak liquor flows through the overflow expansion valve "F" into the absorber. Heating the generator "E" causes evaporation of the refrigerant to take place and pass to the condenser "G" where the increase in pressure and decrease in temperature changes the vapor to liquid.

A comparison of Figs. 1 and 2 shows that the inlet valve of the compressor has relatively the same function as the absorption of the refrigerant which is preventing back flow. The compressor acts to produce a vapor sufficiently dense for liquefaction when proper cooling is effected. The source of heat does this in the absorption machine. The cooling system and receivers are alike in both types. The only point of difference is the method employed for changing the gas to the liquid state. The absorption system is complicated in this respect by the weak liquor take off and the return pump.

The only commercial continuous flow absorption refrigerator operates by a combination of three very simple cycles, those being of ammonia, hydrogen and distilled water. Reference to Figure 3 shows these cycles and the location of the four important parts of the unit. Following through the cycles it will be seen that the ammonia gas is evaporated from the strong solution, the gas being condensed by passing through the condenser. The liquid ammonia goes to the evaporator where its cycle joins the hydrogen cycle. The actual pressure of ammonia is reduced by this contact and therefore the liquid evaporates. The two gases, hydrogen and ammonia, travel together to the absorber where the cycle of water enters. The water removes the ammonia from the mixture and returns strong liquor to the starting point. The hydrogen freed from ammonia repeats its cycle by returning to the evaporator.

As in all mechanical operations, refinements above the bare principles go far towards making this type of refrigerating machine satisfactory and successful. As a commercial appliance, the operation follows the design of Figure 4 and these cycles.

Heat is applied by means of a small safety gas burner to the bottom of the generator "E" which contains strong ammonia liquor. The heat drives ammonia gas together with some water vapor from the generator through the air cooled rectifier "H" where most of the water vapor is condensed and flows back to the generator by gravity. The ammonia gas passes from the rectifier "H" into the water cooled condenser "G." Here the ammonia gas is condensed into liquid ammonia which is cooled as it passes through the gas heat exchanger on its way to the expansion tube "A" at the entrance to the evaporator "B."

As the liquid ammonia issues from the tube "A" into the evaporator "B" it meets an inert gas, hydrogen. The hydrogen assumes most of the total pressure in the evaporator, thus reducing the vapor pressure on the liquid ammonia and therefore the ammonia is free to evaporate with the consequent absorption of heat. Consequently there is a mixture of hydrogen and ammonia in the lower portion of the evaporator. This mixture passes into the absorber since the evaporator is slightly higher than the absorber and contains a cold mixture of hydrogen and ammonia which is heavier than the warmer lighter mixture in the absorber. This induces a circulation of the gases upward in the absorber and downward in the evaporator. In this way the mixture of hydrogen and ammonia is forced into the lower portion of the absorber "C."

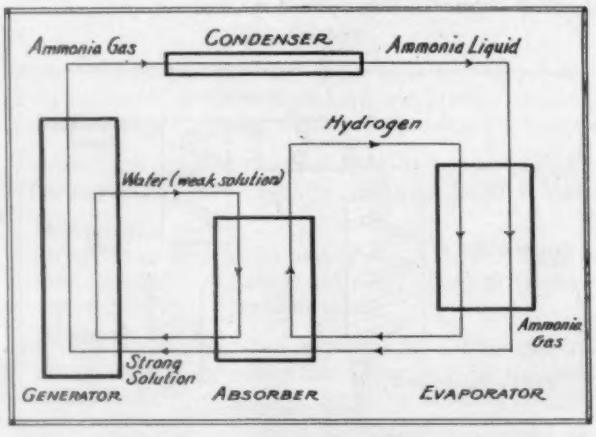


Figure 3. Diagram of continuous flow absorption cycles

As shown in the sketch the liquid level in the generator is higher than the place where the weak liquor pipe enters the absorber. There is, therefore, a flow of weak ammonia by gravity from the bottom of the generator "E" into the top of the absorber "C" and as this pipe is connected to the generator near the bottom, the weak liquor is cooled by the liquid heat exchanger "K" and then trickles through the water cooled absorber where it comes into contact with the ammonia gas, which it absorbs, forming a liquor strong in ammonia. This cool strong liquor passes through the heat exchanger "K" where it absorbs the heat given up by the hot weak liquor and then enters the thermo-syphon pump "D." This thermo-syphon is simply a coil of tubing wrapped around the heating element whose action is similar to the center tube of a coffee percolator.

Heat is supplied for the process by a small Bunsen burner with an input rating between 500 and 2500 B.

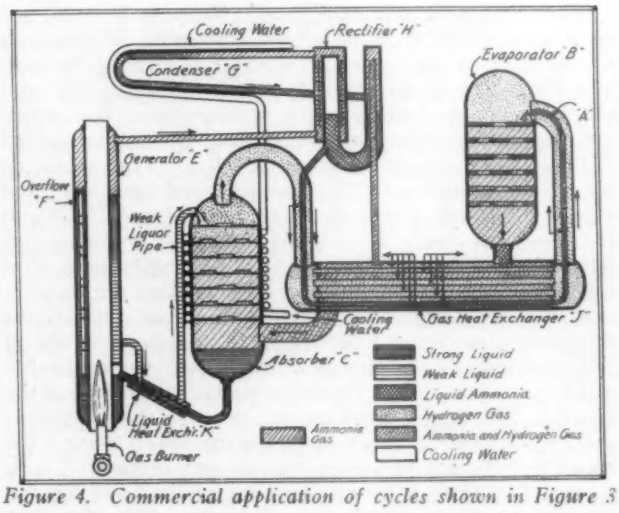


Figure 4. Commercial application of cycles shown in Figure 3

t. u. per hour. This burner is equipped with a thermostatic disc which shuts off the gas if the flame is extinguished for any reason. Two small prongs just project into the outer cone of the flame and conduct enough heat back to the casing holding the thermostatic disc to keep it open when the flame is burning. When no heat is being developed by the burner, the disc snaps into the closed position. The valve stem is firmly fixed to the disc so that the inlet valve is positively moved with any motion of the disc. This disc is snap acting being "all-on or all-off," and opens or closes with a distinct click so that its action becomes audible. A cut, Figure 5, shows this burner and valve. Its simplicity is most evident and the many thousands of these burners in long service is an indication of its safety and reliability.

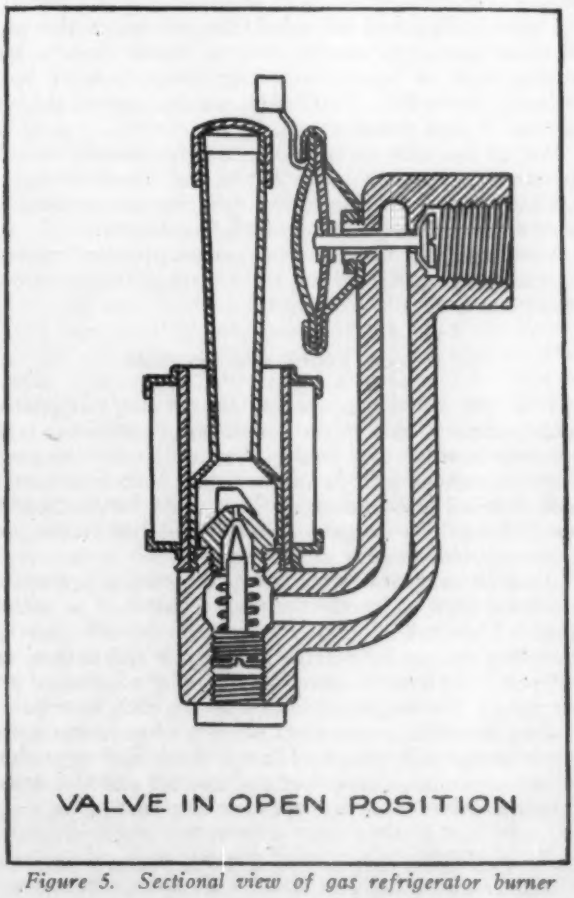


Figure 5. Sectional view of gas refrigerator burner

The temperature of this refrigerator is maintained within very close limits by a throttling control located either alongside the cube trays or in the box itself. The thermostat is gas filled, operated on a diaphragm which reduces or increases the gas input to the desired point. An adjustable bypass around the control point is always set to give a temperature several degrees higher than the desired point. The control acts to permit enough more gas to pass to the burner to hold with practically no deviation the lower temperature. A recent development has been to convert the adjustable thermostatic control to a manually operated "Cold Control." With the throttling thermostat, this feature has always been available on this refrigerator, so only a slight refinement was necessary to change the automatically controlled fixed temperature to any desired point.

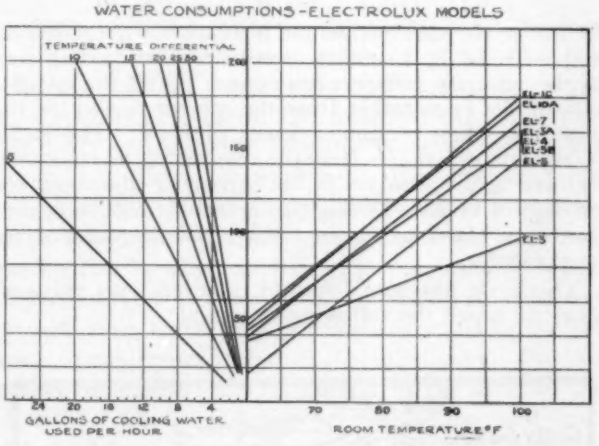


Fig. 6 Water Consumptions—Electrolux Models—Select room temperature in question, move upward until desired model line is reached then move to the left to temperature differential line corresponding to temperature differential between outlet and inlet water. Move down to base line, reading gallons of cooling water used per hour.

A short reflection will show that the gas burned or heat input is the greatest factor in the operating range, the control of the ammonia condensed to a liquid also exerts its influence on the process and cycle. Keeping the liquid ammonia within close limits of temperature and pressure makes for uniform evaporation. This can best be achieved by thermostatically controlling the outlet cooling water. Here again the throttling control is the most suitable with a fixed water by pass with almost enough capacity to produce the required temperature. Figure 6 shows an indication of the water flow needed with different inlet water temperatures for different size refrigerators.

Air Cooling is Possible

It is entirely possible to operate this refrigeration cycle with ordinary air cooling but the many advantages of locating boxes in confined spaces have brought about the development of this cycle with a minimum of water required. If for any reason, cooling water should be completely cut off, the maximum temperature which could be created would be 90°F. The use of a high water temperature thermostat is now possible which completely shuts off gas if the outlet water temperature rises to more than 140°, which would occur if the water were shut down.

With these controls it can safely be said that the operation of the gas refrigerator is foolproof, automatic.

certain and safe, which added to the decided saving in cost over electricity, pointed out in an earlier chapter, make it the outstanding contribution to household refrigerating engineering.

Much could be said about the combination units available for butlers' pantries, kitchenettes or extra units for recreation rooms or similar purposes, but the silent tribute of the hundreds of apartment houses so equipped proves beyond a doubt the wisdom of confining the storing and preparation of food to a small floor space and eliminating unnecessary kitchen travel.

Advantages Similar

These advantages of the gas operated refrigerator are alike for either the continuous flow system just described or the second type, the intermittent flow machine, probably better called the reversible flow cycle. In this cycle, the refrigerant is evaporated, condensed, and collected in a suitable receiver. During this part of the cycle, no refrigeration occurs. With the completion of the evaporation from the solvent cooling of the generator starts creating a lower pressure. The liquid refrigerant evaporates from the receiver in the expansion coil and again dissolves in the solvent or absorbent for subsequent cycles. During this reversible half refrigeration occurs and continues until all the liquid has re-evaporated.

This cycle has been followed in several gas refrigerators of which the following is typical:

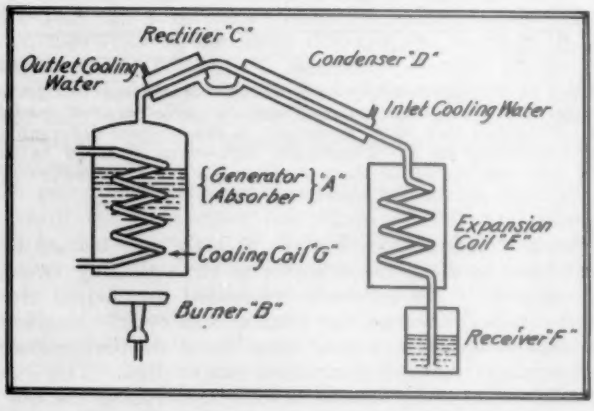


Figure 7. Diagram of intermittent flow machine

In the reversible type machine the two functions of refrigeration and revivifying the spent refrigerant are carried out in the same equipment but with the fluid flowing in opposite direction. Unlike the compression and continuous flow machines, it is therefore impossible to separate the apparatus into its two primary parts, but instead the process itself is divided into the two actions. Figure 7 shows the minimum equipment needed for the reversible or intermittent flow machine.

For simplicity, it will be assumed that the refrigerant is ammonia and the absorbent is water or its equivalent a weak solution of ammonia. Actually the absorbent can be an absorbent charcoal, gel or a solid such as calcium chloride or other material which forms a compound with ammonia readily decomposed by heat, or any other refrigerant and absorber capable of similar action.

The combined generator and absorber A, equipped with cooling coil, contains a strong solution of ammonia at the start of the cycle. No water is flowing through this coil. The generator is heated by a burner "B" and the ammonia and some water evaporates. The water returns to the generator after being condensed in the rectifier "C" generally water cooled. The ammonia vapor is condensed by the cooling condenser "D" and passes unaffected through the expansion coils "E" into the liquid receiver "F." When sufficient ammonia has been distilled from the generator "A," the flame is shut off and cooling water diverted from cooling the rectifier and condenser to the cooling coil "G" in the combination generator-absorber. Evaporation of ammonia stops in "A" and instead the cooled water in "A" begins to dissolve the vapor. This creates a partial vacuum and the liquid in "F" begins to evaporate through the expansion coil "E." Heat is taken up from the space around the coils "E" during this evaporation and refrigeration is produced. After a definite amount of the liquid in the receiver has evaporated, the cycle is switched to the generating side by relighting the burner and changing the flow of cooling water.

Eliminating Undesirable Condition

On first sight it must seem that the alternate heating and cooling would produce the undesirable condition of a fluctuating temperature in the refrigerator, but by proper design and proportioning, a system of even the minimum parts, gives a remarkably steady condition. The dependability of the operating controls with the frequent change of cycle however has been the weak point in the operation of this system. By the application of new points of control it now seems that the problem of control may be most satisfactorily solved. On the basis of normal household requirements the most practical operating results seem to result from a generating cycle of 1/5 and a refrigerating cycle of 4/5 of the complete cycle. This is best worked out on the time basis of 1 and 4 hours respectively.

One of the first reversible type refrigerators actually operated on a time cycle basis, the disadvantage of which can be readily seen from the relative cooling requirements of summer and winter conditions.

Another of the more recent systems operated on temperature differences with rather complicated reversing mechanisms.

Newer Types are Feasible

However, by change in one of the more important fundamentals of design the operation of the newer types promises from careful analysis to amply meet the needs of the household refrigerator. It had been hoped to include detailed information of these units, but because of minor changes in design within the past few weeks, this has been unfortunately delayed.

It can be said, however, that heating of the generator is carried out indirectly through a bath of a second liquid. This has eliminated much of the complication of cooling during the refrigerating cycle and evened out the cycle. This bath serves as the point of control and determines the beginning and end of each reversal.

Because of the intermittent periods of generation, the burner demand is greater for the reversible type than for the continuous type, but the overall gas and water consumptions of the two types are similar.

Note: This series will be concluded in January issue, the final article dealing with "The Future of Gas Utilization."

The Gas Producer

(*Continued from page 46*)

milli-voltmeter or a pyrometer should be employed after proper calibration. Platinum (Pt) and platinum-rhodium (Pt-Rh) thermocouples deteriorate quickly in producer gas, so their use is prohibitive at present platinum prices. Iron-constantan or Chromel-Alumel couples are the least expensive first cost and maintenance.

Furnace and stack temperatures should be taken with instruments suitable for the conditions involved. Up to 1600° F. iron-constantan pyods are satisfactory; over 1600° F. and under 2300° F. Chromel-Alumel or Pt-Pt-Rh couples are more accurate. A standard Pt-Pt-Rh couple tested by the Bureau of Standards should be kept for check work only and used for the checking of the thermocouples used. A check pyrometer or milli-voltmeter for both base and rare metal couples is useful for calibrating the instruments used during tests.

Fuel, ash and solids analysis equipment is found in most industrial laboratories; if not at hand, a competent laboratory may be employed to do the chemical analysis work.

Sampling the Fuel

The fuel sampling operation is best carried on by taking from various parts of a car as it is unloaded, a shovelful, selecting about a 500 pound sample from a car. This sample must not be allowed to dry or get wet. It is piled in a cone shaped pile, quartered to about a 50 pound sample, opposite quarters being selected. Pieces over one-half inch in diameter, after the sample is reduced to 100 pounds, are as large as are practical. If lump coal is used, it is difficult to secure a representative sample from the car. However, for producers it should be crushed, so the sample can be taken after the fuel passes through a crusher. If sampled from a crusher discharge, care must be taken not to get all fines or all coarse material. When the samples from several cars have been collected they may be quartered and two 50-pound samples of coal one-half inch and under, sent in a sealed container to the laboratory for analysis. It is assumed that the laboratory has the proper grinding or pulverizing equipment for further reducing the size of the samples for analysis.

The ash sample should be secured by taking a shovel of ash from each of four points in the ash pit at hourly intervals and quartering down, so that a 50-pound daily sample is secured. The cinder size should be kept by crushing so that for 100 pounds no cinder will be over 1 inch and for 50 pounds no cinder will be over ½ inch in diameter. If large clinkers are encountered they should be broken into 2 inch size before quartering is started. Watch the quartering operation so that there is no appreciable physical separation as the piling and quartering is done. The weight of ashes or cinders or the determination of moisture content is difficult to obtain, as the cinders accumulate in a water pan and are wet. However, they can be dried if special data on ash is desired.

If an orifice of known diameter is used for the determination of steam flow, a calibrated pressure gauge will give accurate results with Napier's formula. If a steam flow meter is used it is necessary that the operating instructions for the unit used be followed. An orifice meter is the most practical for steam test work, although a venturi throat meter as a rule is more accurate. Calculations on flow depend upon meter constants, steam pressure temperature and moisture content. A calorimeter will give the moisture content of the steam, although there will not be much error if this item is neglected, unless steam line conditions are such that excessive condensation results. Such conditions are: long, poorly covered steam lines, wet steam from boilers, low velocity in large, oversize lines and lack of proper drip piping on the lines.

(*To be concluded in January issue*)

We're Selling Bridges

YOU may think you're selling water heaters or ranges or furnaces, or even gas service—and this too used to be considered an advanced stage of salesmanship—"Gas, the ideal, ultimate, effortless fuel." But that isn't the fact at all, when you're talking the language of public relations—the language of the man in the street and the woman in the home.

Believe it or not, what you're really selling is bridges—plain ordinary bridges, like those that carry you over the rivers and highways from the place where you are to the place where you want to be. That's what I mean by a bridge, and that's what Mr. and Mrs. Customer mean when you succeed in getting them interested in a gas appliance. They're looking for a bridge. When they reach your display room, or when your salesman reaches their home, they are already standing on the brink of the stream,—that is, if you're lucky. For one reason or another they're anxious to get over on the other side. On this side they see nothing but hard work and drudgery. Soot and ashes are all over the bank. Perhaps it's a little lonesome because many of their friends have already found the bridge to the other side, and they seem to be having such a good time about it. The other side looks comfortable, up-to-date, and there's plenty of time to do the things they've always wanted to do. But the stream is wide. They can't jump it alone. The current is too strong to swim. Not a boat in sight. Why doesn't someone build a bridge?

The bridge is there, but it isn't always easy to recognize, because the gas man, whose job it is to send people over the bridge, has cluttered it up with toll gates, and disguised it so with machinery (which may look vital to him) that it might be a non-reversible, gear-toothed, centrifugal gadget, for all the customer knows.

Gas Appliances are the bridges that make it possible for gas users to get over where the grass is green, and the sun shines all day long. They don't care much how the bridge operates—whether it shoots them over or carries them over—so long as they get there in time to do the things they want to do. If there's no compelling reason to make them want to get over, if they're perfectly satisfied with where they are and if you haven't got enough imagination to dangle the delightful possibilities before their eyes, then you can build bridges from now until we all become prohibitionists before your bridges will suffer a heel print to mar the macadam.

—Henry Obermeyer in an address given before New England Gas Assn.

Methods And Results Of Trade and Dealer Cooperation

E. N. AVEGNO
New Orleans Public Service, Inc.

THIS paper only covers the sale of Automatic Water Heaters, as this is the only gas appliance now being sold by us on a cooperative plan, and has been in operation but a few months.

We believe the Gas Company should be interested in the sale of gas consuming appliances principally to promote the sale of its commodity, and not in the merchandising profits. We do not believe it should enter into unfair or unethical competition with the dealers and plumbers who sell gas appliances.

If we expect to prosper and increase our "send out," we should encourage and assist merchants and plumbers to sell and install, at a profit, equipment built to consume gas. This does not mean that I am advising gas companies not to handle appliances. On the contrary we think they should handle and display on the sales floor every type of approved appliances and that their sales floor should be used as a sort of cooperative sales room for dealers.

The plumbers are not salesmen, therefore, we do not believe we should leave the sale of equipment, which is of vital importance to the utility and the only outlet for the sale of its product, entirely in the hands of the plumbers. But if the utility, plumbers and dealers unite in a merchandising plan, whereby the profits on the sale and installation of the appliances are allowed to go to the dealers and plumbers it may prove a most satisfactory arrangement and increase the gas company's "send out."

An entirely new plan was adopted, whereby dealers representing the leading makes of automatic water heaters and a committee representing the Association of Licensed Master Plumbers were invited to a conference to discuss the feasibility of combining our efforts to increase the sale of automatic water heaters.

It was explained that the Gas Company would dedicate part of its floor space to the dealers to permanently display samples of their heaters. Each month one dealer would be allowed a portion of the display floor to show his entire line, he would also be allowed to display his equipment in the show window, and during this period the Company salesmen would recommend the heaters featured. The dealers were to successively enjoy this privilege each month. We agreed to carry in our newspaper advertising copy the names of the heaters represented by the dealers participating and all advertisements would be issued cooperatively over the names of the New Orleans Public Service Inc., New Orleans Automatic Water Heater Dealers, and Licensed Master Plumbers.

Heaters sold by the Company would be purchased from the local dealers at a discount which would allow them to make a reasonable profit. It was explained to the dealers that the idea of the plan was to increase sales and by selling Automatic Water Heaters at list price, plus installation cost, we would not be in unfair competition with them, but should on the contrary increase their sales.

The plumbers were told of our desire to assist by giving them the installation of all Water Heaters sold by the Company, without favoring any particular group. The purchasers would have the privilege of selecting their own plumber to make the connections and to deal directly with the plumber or through the Gas Company. If, on the other hand, the buyer had no preference it was thought advisable from the Company's position, and to avoid unjust criticism, to let the selection rest with the Plumbers' Association. However, in order to protect the purchaser, the Public Service would have the privilege of requesting the Association to get two or more plumbers to send estimates to the Company.

The Public Service (except where the customer deals directly with the plumber) was to contract for installations with the plumbers and not through the Association.

Plumbers making installations of heaters sold by New Orleans Public Service are to receive, in addition to the cost of installation, a commission of 22½% of list sale price, even though the sale did not originate with the plumber making the installation.

In the financial arrangement there is no charge to be made to the dealers or plumbers for display space nor general advertising, this being assumed entirely by the Company. The entire program met with the hearty endorsement of the group.

Yes—
You can have ample hot water in your home this winter
Special Display of Pittsburg Heaters
New Orleans Public Service Inc.

Specimen of Newspaper Ad used in New Orleans

The manufacturers, through their local representatives, participating in this arrangement are:

Crane Company
Standard Sanitary Supply Company
Humphrey Heater Company
Ruud Heater Company
Koil-les Heater Company
Hoffman Heater Company
Pittsburg Heater Company

June 1st was selected as the date to start merchandising on the new basis. During the first month few sales were made, as our salesmen had no experience in the sale of automatic water heaters, and it was therefore necessary to train them. The dealers cooperated to the fullest extent. They attended the meetings and acted as instructors. They gave our men the benefit of their long experience. Each dealer told how his heater was constructed, spoke of the automatic features, the selling points, and the necessity of recommending the proper type and size of heater for each individual job. In addition to this, at the salesmen's request they now call on prospects and assist in closing sales.

In July this new merchandising plan began to bear fruit; 215 heaters were sold and of this number 41 were secured by Company salesmen. During the month of August a substantial increase was made over the previous month, orders were taken for 294 heaters and 69 of this number were secured by our sales department. The Company and dealers report total sales for September 353, an increase of about 65% over the July sales, a total for the three months of 862 heaters. The orders secured by the Company

Portion of a paper read before Southwestern Regional Section of the Natural Gas Division, American Gas Association Sales Conference, Dallas, Tex., November 14, 1930.

salesmen are encouraging when consideration is taken of the fact that they were inexperienced in the sale of automatic water heaters, as we were not merchandising this appliance previous to the present cooperative dealer and plumber arrangement.

The dealers are very optimistic and state that their business for the months of July, August and September showed a fair increase over the same months of last year, whereas, during the first six months of this year, (previous to our present plan), they showed a loss as compared to the same period of last year.

The gross profit on Automatic Water Heaters sold by our sales department during the three months ending September, amounted to . . . $5,440.00

Cost of advertisements (3 months)	$4,000.00
Commission to plumbers and salesmen	3,660.00
Total expenses	$7,660.00
Net expenses	$2,220.00

The above expenses do not include show room rental and overhead.

We estimate our efforts in this cooperative movement were responsible for 25% of the total sales, or, in other words, resulted in increasing the number of heaters sold by 213, at an expense of $2,200.00, or less than $10.50 per heater.

When you consider that Automatic Water Heating is a desirable and profitable year round load you will agree that the expense in securing this additional revenue is surely justified.

We were of the opinion that the plumbers were unreceptive, antagonistic, unwilling to cooperate and anything but friendly to the utility, but we were as much at fault if not more, because we did not meet with them, listen to their problems and tell them of ours. Our relations with the plumbers and dealers have greatly changed since we started our new method of merchandising, because they now know we are interested in the sale of our fuel and not in the profit on the sale of the equipment.

I have said that plumbers are not salesmen; generally this is true, but through our plumber-dealer-Company-sales-plan we are developing the plumbers into first-class salesmen. They are furnishing our sales department with the names of prospects; many of these leads have already resulted in sales, and many more will develop into sales in the near future. Some few orders have been secured by the plumbers without the assistance of our salesmen. We will soon have working for us, in addition to our regular twenty-five paid salesmen, several hundred plumber salesmen.

Advertising in an arrangement, such as we have, must be carefully planned to benefit the entire group.

Our advertising department created and built the advertisements with the thought of awakening a greater public appreciation of the value of hot water service. The first, or opening advertisement told of how the Automatic Water Heater Dealers, Licensed Master Plumbers and New Orleans Public Service, Inc., united in a cooperative sales plan making it possible for every home in New Orleans to enjoy the comfort and convenience of modern hot water service. Follow-up advertisements of a quarter of a page are run weekly, in the four local papers, bringing out the following points: Cleanliness, Health, Convenience, Economy, Twenty-Four Hour Service, and Convenient Terms.

Show-window of Public Service Company featuring the Cooperative Water Heater Campaign

In every advertisement it is brought to the attention of the public, "Heaters can be purchased from the Public Service, Licensed Master Plumbers, or Water Heater Dealers." Advance copies of these advertisements are mailed several days before they appear in the daily papers to the licensed master plumbers and water heater dealers. Attractive billboards, and street car cards are also used to advantage.

We believe a serious selling problem faces the Utilities. The attitude throughout the country of the Merchants, Plumbing and Heating Contractors, Hardware Dealers' Associations, and other organizations condemning the Utilities for selling appliances is one that should not be overlooked by the Utilities. Many gas and electric trade magazines are giving considerable space to the discussion of the subject which these associations term "The Unfair Competition of the Public Utilities." We read of the adoption of resolutions, the framing of laws in many states, and petitions requesting Congress to enact laws to make it illegal for Utilities to sell appliances.

Admitting that the Utilities have the legal right to merchandise equipment to build up a load, the unfavorable publicity they are now getting certainly is not helping their public relations and it is up to them to make a move to correct this feeling of antagonism, which exists among competing business. We do not claim to have the only correct solution to the problem, but we have accomplished a great deal in our community toward bettering these conditions.

The following letters will give you a picture of present improved conditions, as compared with those of former years.

The following letter of protest was received by our President in 1928, and was signed by all the Water Heater Dealers in the City of New Orleans. Following this letter are excerpts from some of the letters that have been received from these same people since the inauguration of the present Cooperative Plan between

The Plumbers also Dressed up their Windows as part of the Cooperative Plan

our Company, the Water Heater Dealers, and the Plumbers.

The letter of protest reads as follows:

"On several occasions our committee has had the pleasure of interviewing you regarding co-operation between the Gas Company and the Gas Appliance Dealers, and we feel that the interviews were very beneficial to all concerned...There being noticeable at the present time a better feeling toward each other than we believed existed at any time in the past.

"The last interview with you was centered on the advisability of the New Orleans Public Service discontinuing the sale of water heaters and in conformity with your request we are handing you herewith a few details, and reasons why we believe it would be beneficial to the N.O.P.S., to discontinue the sale of water heaters.

FIRST: It is hardly probable that you are showing a reasonable net profit on these sales.

SECOND: You are in direct competition with approximately three thousand men of family who are directly interested in the sale and installation of gas water heaters and other Gas Appliances, namely: Gas Appliance Dealers and their organizations and the Master Plumbers and their organizations, which of course tends to cause an antagonistic feeling on the part of each individual.

THIRD 99% of these men buy gas from the New Orleans Public Service, Inc.

FOURTH: Each of these men are duty bound to sell the public on the idea of gas in order to sell the gas burning appliances, which means approximately 3,000 salesmen for the Gas Company which are not on your pay roll.

FIFTH: These 3,000 men can be put in the class of 100% boosters if the above plan is carried out.

SIXTH: The terms on which the Public Service Company sells gas appliances are down to a point where it is impossible for the Gas Appliance Dealers to meet them...In view of the necessity of Gas Appliance Dealers selling New Orleans Public Service to the public before an appliance can be sold we believe that we are victims of grossly unfair competition.

"We believe that the above items are the most important to be considered in this matter, and in view of the fair attitude that is your policy to maintain, they are of sufficient weight to induce you to discontinue at least the sales of gas WATER HEATERS.

"You may be assured of the earnest cooperation of the undersigned concerns and all other branches of the gas appliance and plumbing industry which we believe will be a very strong factor in promoting good-will between the New Orleans Public Service and New Orleans public.

"Your careful consideration of the above will be greatly appreciated."

You will admit that there is nothing friendly about the letter I have just read. You can easily detect a change in the following excerpts of the letters from the same people, which clearly indicates the satisfaction with which the plan is being received.

"We are well pleased with this plan, and the results have been even better than we expected. This plan has done a great deal to bring about a better understanding between the plumbers, New Orleans Public Service, and Water Heater dealers. We believe that it has resulted in the sale of more water heaters than would have been sold under the old system, and as far as we are concerned, has been very satisfactory indeed."

Another dealer says:

"We believe this plan offers the best solution for merchandising automatic water heaters in cooperation with the licensed master plumbers.

"We have found the co-operative advertising program of great benefit in breaking down sales resistance and making it easier for both plumber and dealer to sell the consumer the automatic heater.

"We feel this co-operative program will bring us additional sales and bring your company additional revenue for fuel used on such appliances.

"The writer personally feels that this torch will gradually spread amongst other large utilities in this country."

This dealer is enthusiastic:

"We take this opportunity to congratulate both your sales and advertising departments, and we are sure that as time goes on with the continued co-operation, water heater sales in the city will be materially increased.

"Assuring you that we stand ready at all times to do everything we can to help you along with your campaigns, we are,

Yours very truly."

This dealer goes into considerable detail, but is genuinely sincere:

"As one of the Heater Company representatives, who a year ago signed a petition to you, asking that you discontinue the sale of one make of water heater, I feel that you would be anxious to know the results of our last agreement; viz., selling all makes of water heaters represented and approved by A.G.A. in New Orleans.

"Our water heater business has increased considerably considering the depression in the home building line. Your advertisement department must get the credit due it. It has brought us a good many orders where heaters were not in working order, or beyond repairs.

"It is astonishing how much the New Orleans Master Plumbers are now using every effort to make the sale of water heaters as well as other gas appliances. I am sure you have noticed the sales increased from sales reported by heater dealers in the last four or five months. This I consider good business for all parties concerned.

"Sincerely hoping that you will continue with the present method of promoting the sale of water heaters in New Orleans, I am,

Yours very truly."

And last, we have an excerpt from the letter of the President of the New Orleans Association of Master Plumbers, who says:

"It gives me great pleasure to very highly commend the cooperative sales plan between the water heater dealers and plumbers, and the New Orleans Public Service, Inc., which has been in effect now since June 1st.

"We feel that all parties concerned have been highly benefitted thereby."

The co-operating dealers, a committee representing the licensed master plumbers, and the Company representatives meet regularly once a month at luncheon where problems are discussed in a most friendly manner, and everyone seems willing and eager to help the others.

We are highly gratified with the plan and believe its possibilities are very great, and that much good will result to all parties concerned.

Christmas Displays To Sell Gas Appliances

CHAS. N. TUNNELL

THERE are two types of Christmas displays. One type is built purely to express the season's greetings and to build good will and community cheer; the other is to also express the season's greetings, but it is likewise a type that stimulates some additional holiday sales. The gas appliance dealer is usually more interested in the latter type.

Originality means a great deal in making a successful holiday window trim for gas appliances; but a glimpse at a few such displays used last season may be of help to appliance merchants who can adopt or adapt these or similar displays for their own use this season.

One Southern appliance department manager of a gas distributing company took a very common-place situation and made it into an appealing holiday display.

Having a medium size display window, this appliance department manager used light pine boards to build a series of three stair-step-like platforms in his window, each of the three steps being large enough to display a stove and each one being one foot higher in elevation from the window floor than the next.

A roll of cotton was purchased, fluffed up and spread over the entire floor space, while imitation snow gave a glitter of the real article. The background to the display carried out the winter season and holiday spirit by showing a painted scene of a modern city home draped in snow. To the one corner of the

(*Continued on page 67*)

It Is a GOOD Gas Range That Has This Red Wheel

Patents Pending

TIFFIN model CASH PRICE $99.75 except in extreme Southeast, Rocky Mountain Region and beyond

Patents Pending

PATRICIAN model CASH PRICE $195.00 except in extreme Southeast, Rocky Mountain Region and beyond

A New Magic Chef Model at an Attractive Moderate Price

SOMETHING we have always wished for but thought it couldn't be produced!" That's what dealers who have seen the new TIFFIN Model say about this new member of the Magic Chef family.

Priced under $100, this new Magic Chef, in a more compact and convenient size, brings Magic Chef charm and style within reach of thousands of women who could not afford the larger models.

The leading national magazines this fall have carried page and double page advertisements in full color announcing the Tiffin Model of the Magic Chef. These advertisements are attracting wide-spread attention to this remarkable gas range achievement. Dealers everywhere are feeling the response and orders are rolling in at a lively rate. Tie up your store to this important national advertising to get your full share of the substantial demand that is being created for the Tiffin Model of the Magic Chef. There is nothing in the gas range field today that can match it at the price. It will pay you to get full details.

Send name and address for free copy of booklet showing modern kitchens.

Magic Chef

AMERICAN STOVE COMPANY . . . DEPT. B, 801 CHOUTEAU AVENUE, ST. LOUIS, MO.

LARGEST MAKERS OF GAS RANGES IN THE WORLD

Here it is!
The New Improved "K" Type AutomatiCook *with 5 great Features*

THE NEW "K" type AutomatiCook has five great features to make gas range selling easier for you. Here they are: (1) Handsome chromium plate finish. (2) Fully visible dial. (3) Fool-proof One-Minute Temperature Check. (4) Non-Clog by-pass. (5) Only *one* bolt attachment to range.

The new AutomatiCook is smaller, more handsome, more compact. It's better looking. There's a One-Minute Temperature Check. Every working part is accessible from outside of range.

More than 100 makes of the new ranges will be AutomatiCook equipped this year. Learn all about this greatly improved heat control now. Write for full descriptive literature . . . *today!* It might result in your selling more ranges this season.

ROBERTSHAW AutomatiCook

ROBERTSHAW THERMOSTAT COMPANY
Youngwood, Penna.

STRATIFICATION

Those who were fortunate enough to see the glass exhibit showing water circulation at our booth at Atlantic City, realize *WHY* the Kompak excells in hot water capacity.

Notice the Kompak Construction.

FIRST—**The heating coil is under the tank so that during the heating period, the entire tank is heated from top to bottom.**

SECOND—**The hot water from the coil leads to the *top* of the tank, so that during the drawing period, the hot and cold water are always stratified, there being no mixture to dilute the hot water at any time, and *hot* water is always available at the faucet.**

No other heater is made to conform to these two basic principles.

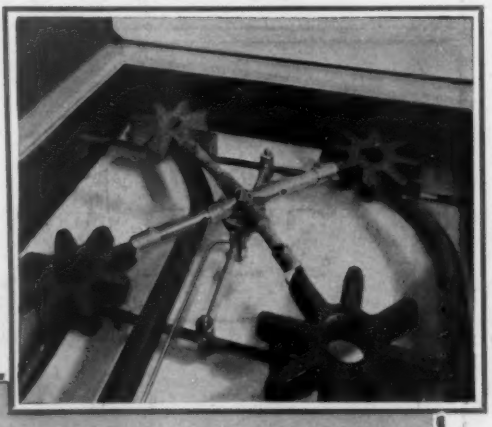
THE KOMPAK COMPANY,

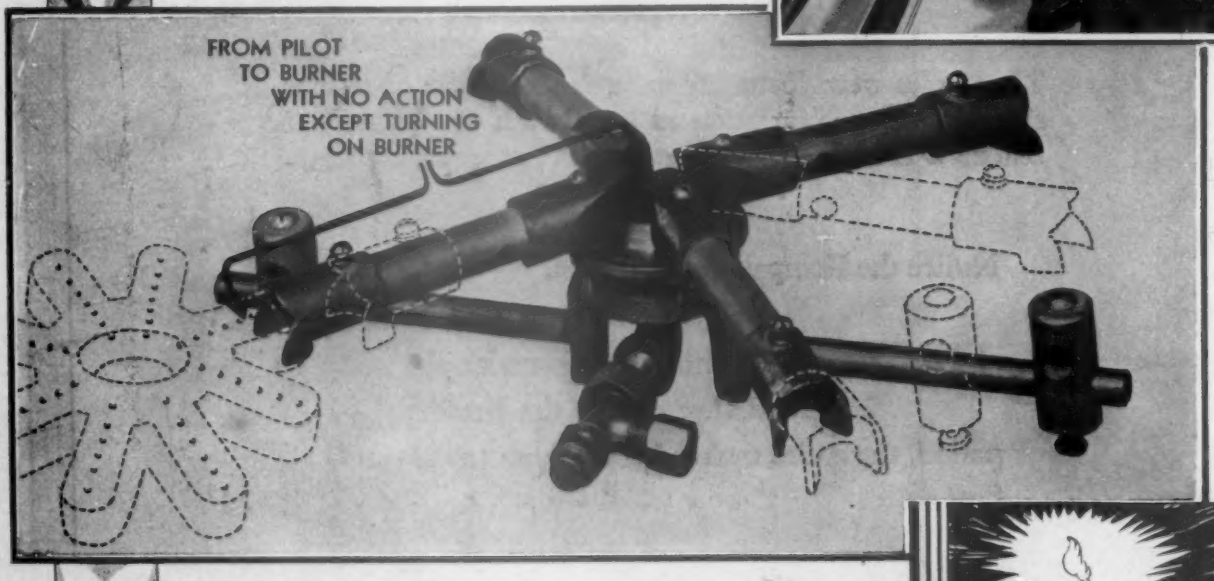
New Brunswick, N. J.

KOMPAK
TRADE MARK REG.

"PATROL-FLASH" LIGHTER

FOR TOP BURNERS ONLY AT A PRICE MEETING POPULAR DEMAND





Merely turn on the gas. "Patrol-Flash" lights the burner automatically and positively. No buttons to press. No other valves to open. Just turn on the gas with one hand and the burner flashes aflame instantly.

"Patrol-Flash" top burner lighter only may be readily installed on any stove using round rod burner supports. Adjustable features of "Patrol-Flash" allow the tubes to be swung through a 1½" arc and an extension in length of ½". The height of the new lighter may be also varied to meet the depth of various burners and their supports.

Lips on the burner ends of the tubes insure accurate alignment of each tube for most efficient ignition. The customary lighter tapping in the manifold is used for the pilot line furnished with "Patrol-Flash."

A word will bring detailed literature.

Since the dawn of time there have been other lighting methods, but only the flash-back principle used by "Patrol-Flash" gives true automatic gas range lighting.

THE PATROL VALVE COMPANY, *Cor. Locust Ave. and W. 114th St.*
CLEVELAND, OHIO

Christmas Displays

(Continued from page 62)

terraced lawn of the home was a Christmas tree, while children were playing about.

The picture of this outdoor Christmas tree helped to put atmosphere into the window; but the appearance of actual merchandise helped to convert passing suspects into actual prospects for new gas ranges and other appliances. Stationed on the display window floor and at the edge of the first stair-step platform was a small black rusty cook stove like grandmother used to use when she baked with wood or coal fires. On the first step was an oil burning stove, while on the second step was a small obsolete gas range. Mounted on the top step was a modern stove in colored trim that would be the pride of any woman's kitchen. Standing beside this gas range and with one hand opening the oven and the other pointing towards the front of the window was a smiling cardboard cut-out figure of Santa Claus.

A roaster could be seen in the oven, the top half being tilted up to reveal a portion of brown turkey—which was actually a cardboard, cut-out to show the legs and breast of the turkey.

Use of Placards

A small placard was stationed on the floor directly to the front of the iron wood or coal burning stove to announce: "Here is the kind you or your mother started housekeeping with." A similar card was to the front of the oil stove to continue: "Then you stepped up to this stove to escape some of the heat and litter in the kitchen." A third card placed by the small gas range declared: "And here entered the modern kitchen with its gas range for continuous service and comfortable convenience." A card placed to the front and center of the new and modern gas range invited: "Santa invites you to mount the last step in kitchen modernity—surprise the wife with a new gas range that harmonizes with her kitchen."

Another gas appliance dealer obtained some increased sales and contact for future follow-up by building a holiday display of gas appliances for lasting gifts. A local sign and decorating company was able to supply the display man of this concern with a cardboard figure of a woman—representative of the average house-wife. A second cardboard figure was that of old Kriss Kringle. In the woman's hand was a small savings bank. She was in the act of placing it in Santa's hand.

An attractive background depicting the holiday season gave the desired setting for the gas appliances placed over the window floor space. A gas range, space and water heaters, a gas fired incinerator and a gas fired refrigerator along with several smaller appliances were on display.

A single placard was in the window. It explained the mind of the woman, the average housewife, by stating: "Santa, just put my Christmas savings into a home convenience gift that I'll appreciate the year around." And judging from the response, a number of prospects decided this was logical reasoning and had Santa Claus to invest their holiday gift funds into gifts that were home comforts for the entire family.

A cooperative type display was used to a fine advantage by one gas company which likewise maintained a commercial department. This concern had worked pretty closely with plumbers and with the largest department store of the city that likewise sold many gas ranges and appliances. In order to make the display more forceful and yet cement the good will of these other firms, the commercial manager of this gas firm invited others to help with his Christmas display.

Here, too, a model kitchen was built. This kitchen was equipped with gas range and gas-fired refrigerator. An attractive kitchen sink with drain boards etc. indicated that the kitchen had running hot and cold water. Pretty colorful curtains were draped over a dummy window in the kitchen; the floor space was covered with linoleum. A porcelain top kitchen table was filled with foods, cake ingredients, mixing bowl etc, while a wax model borrowed from the department store was dressed in a dainty little housedress and in the act of baking a fruit cake. One finished fruit cake was on display in the window.

Small cards in the window acknowledged that the house dress, the drapes and floor covering were furnished by a particular department store; the plumbing fixtures installed by a local plumber; the fruits and foods by a large grocery store in an adjoining block; the flour by a local milling concern; and that the gas appliances could be bought with a small down payment in the commercial department of this gas company.

Another card announced: "Make your Christmas baking pleasant with a new gas range—we will bake your Christmas fruit cake for you in our home service department and present it to you with the purchase of any gas range during the holidays."

And just as announced, free fruit cakes were given with each gas range sale, the size of the cake being determined by the price of the range. The flour for the cakes was furnished free by the milling concern mentioned in the window. A special price was obtained on all fruits and other ingredients used in the cake by purchasing from the grocer mentioned in the display. The actual baking of the cakes created quite a bit of comment and contact from women who visited the home service department to see the work and to see how the woman in charge of this department baked such nice fruit cakes. This contact plus the pulling power of the suggestive display made this holiday window display one that charted up some actual sales.

American Gas Association Offers Samuel Insull Award for Outstanding Progress

The American Gas Association has announced the offering of a special annual award to the member gas company of that organization, which has made, during the previous calendar year, the most outstanding progress in distinguished public service.

This award has been made possible by Samuel Insull, of Chicago, Illinois, and will be known as the Samuel Insull Award for Distinguished Public Service.

The first Samuel Insull Award will be for the calendar year 1931 and will be presented at the 1932 Annual Convention of the American Gas Association. All member companies of the Association in the United States, its possessions or in Canada, whether large or small, manufactured, natural or mixed gas, will be invited to submit exhibits for consideration of a special committee which will have charge of examining the exhibits and selecting the winning entrant annually.

The purpose of the award is to give official recognition of the gas industry to the outstanding accomplishments of its members in rendering distinguished public service, so as to stimulate the industry's efforts in this direction and inform the industry as to the methods by which these accomplishments have been achieved.

Classifications of Companies

In order to make the comparisons of company accomplishments more valid and significant, the following classifications have been established for companies submitting exhibits:

Class A—Companies having 125,000 or more meters.

Class B—Companies having more than 40,000 and less than 125,000 meters.

Class C—Companies having less than 40,000 meters.

The award for the year 1931 will be available to companies in Class A—those having 125,000 or more meters. The award for the year 1932 will be available to companies coming within Class B, and that for 1933 will be available to companies within Class C. In subsequent years the award will be rotated in the same order indicated above.

The winning company will receive an engrossed certificate suitable for mounting in the company's offices as public evidence of its company achievements, and in addition will be entitled to designate three members of its personnel who may attend one of the special courses for business executives such as the course in Public Utility Management and Economics offered during the summer months by the Graduate School of Business Administration, Harvard University, or other courses offered by similar institutions. Those individuals designated by the winning company will be entitled to free tuition and expenses during the period of the course at the institution selected.

All technical, accounting, sales, financial, and general administrative accomplishments which the company considers as having contributed materially to the

distinction of the public service rendered will be considered in detail.

Because the growth of any public utility depends largely upon the measure of its success in serving the public, one important index of the company's achievements in rendering distinguished public service will be the trend of the company's growth, over and above the natural increase in growth due to the increase of population, and the business development of the territory served; and more particularly the degree to which the company now is serving its potential market.

Making a Success of the Small Company

Establishing the Foundation for Supporting a Maximum Sales Volume

A. A. WHITLOCK
General Manager, Piedmont Utilities Company

Sales floor, Piedmont Utilities Company, Hickory, N. C.

(*Continued from October issue*)

IN assuring the best possible results from the selling organization several items must be kept uppermost in mind. These include the selection and training of salesmen, to say nothing of their compensation, the establishment of attractive, profit-producing rates, and the building of a service organization. In addition, the matter of regularly sending out the proper publicity and advertising is a very important function of any gas company. This section of the article will endeavor to outline our procedure relative to some of the above problems. Incidentally, it is felt, on the basis of subsequent results, that our selection of salesmen, rate making and the other matters were rather successfully planned and handled.

It has never been my idea that a man must come under the classification of "crack" or "high pressure" salesman in order to do a good job by way of bringing in the required volume of business. Anyone who is neat, gentlemanly, courteous and thoughtful of the prospect's best interest is the type to be selected. Truthfulness is of course a necessary qualification. In this latter regard it is a fact that the salesman who is as much concerned with the proper functioning of the appliance after it has been installed as he was with getting the name on the dotted line is vastly more desirable than the man who misrepresents facts to induce the sale. Indeed, misrepresentations leave the gas company holding the bag and going to no end of trouble in order to rebuild customer confidence.

Where it can be done, I believe in selecting a salesman who is a man having other responsibilities than his position with the company. I prefer one who has a family at home to care for, which naturally gives him something more to think about than just putting over sales and collecting his pay-check. Obviously, such a type of man is not so prone to be independent and walk out on you on the slightest provocation.

Many companies have made the serious mistake of employing what might be termed wildcat salesmen, who are floaters; salesmen who are only interested in making ends meet for a while and then picking up and seeking employment elsewhere. These salesmen, I have found, are the ones most likely to tell the customer in advance what their bill will be. And while that might, for the time being, make a greater number of sales, still the salesman with responsibilities other than his job, will do vastly better in the long run. I would rather have a man make two or three good sales per week than to have one make five or six on the high pressure plan, because clearly the former sales are most advantageously sold from the company angle—and from the consumer's as well.

The main idea I try to instill into the minds of my salesmen is the fact that faith in the company must be established and good will built, regardless of sales. Referring back to the matter of attempting to tell the customer what the monthly blil will be in order to put a sale over, we follow the plan of preferring to lose the sale entirely rather than resort to such tactics.

Salesman Compensation

In compensating our salesmen, we believe within reason in doing everything possible for them, for after all, the salesman is one of the most important links in the organization. We pay both salary and commission and on an exceptionally good job, pay a bonus in accordance with the gas load obtained. We also try to see that every sale means something to our salesmen. For instance, if a prospect is turned over to me or another employee, who is not a salesman, or if a prospect phones or is brought in by someone who is not connected with the company, no effort is made to close the sale except through the salesman himself. If the prospect is one that can best be handled by myself or some employee other than a salesman, that is a different story, although I often help the salesmen close their prospects, allowing them full commission.

By such procedure we endeavor to prove to our salesmen that we have their interests at heart and as a consequence, the salesmen do not hesitate to come to anyone in order to receive assistance in putting over the sale.

Following up my idea in selecting a salesman, I also try to pick a local man with all of the qualifications mentioned and if any are missing, I would prefer that it be sales ability, because if the man has it in him proper schooling and cooperation will bring out any selling ability.

When we started out to make our rate

schedule, we approached the matter from a common-sense standpoint rather than from a purely mathematical angle. It is our idea that entirely too much time is spent on a rate that would theoretically make a company pay with a limited number of customers. In this respect some of the small companies' rates average well into the $2.00 and more class. When the Piedmont Utilities Company started on its rate schedule, it looked over the town to be served first and tentatively figured about how much gas service each home would stand for. Then we calculated the number of possible meters and let the matter go with the intention of making up on increased gas consumption at a low rate per thousand. As a result we adopted the following rates:

Net Rates

First one thousand cu. ft.....$2.20
Next two thousand cu. ft. each. 1.85 each
Next two thousand cu. ft. each. 1.75 each

First five thousand cu. ft.....$9.40
Minimum—six hundred cu. ft. per month, $1.50.

As the first 5000 cu. ft. serves for our comparison, we will not quote rates above that figure, this being what we call our straight domestic cooking rate. At the time of making these rates, we knew that we were going to have some fighting to do. It was with this in mind that we formulated the following schedule. Refrigerator and automatic water heater rate—any customer wishing to do so may avail themselves of the yearly combination rate, which is as follows: Where a refrigerator and automatic heater are used, or a refrigerator in conjunction with another appliance, the customer may avail himself of this combination rate, which gives him the privilege of making a yearly contract with 1500 cu. ft. as a minimum and amounting to $3.13 net per month, all gas above 1500 ft. being at the rate of $1.20 per 1000 net.

The result of such a rate is that the customer saves by using this rate on the first 5000 cu. ft. of gas $2.07, the amount being $7.33 per 5000 as against the $9.40 on a straight or domestic cooking rate.

There are many cases where we have found the customer using an electric range or oil range and no method of heating water or refrigerating. In this case we will install a water heater or a refrigerator for him and he will find himself on the straight rate. However, he will soon come to realize that he is using in excess of 1500 feet of gas and that by placing a range in his kitchen he can not only take the low rate on water heating and refrigeration, but can stop the use of 4c electric current as against $1.20 gas. As a result out goes the equipment he is using and in goes the gas range.

This same rate works backwards. When we sell a man a range, he is using a higher rate. For the addition of a water heater or a refrigerator he can operate at a lower cooking rate and at the same time have one or both conveniences on this same low rate. Consequently this has helped materially in increasing our output.

Our idea is that we would rather have 1000 customers on the combination rate using 4000 to 5000 cu. ft. of gas per month, than the same number using 1000 to 1500 on the higher rate. Incidentally by such a scheme we have something with which to combat competition.

Building a Service Organization

After we had actually began serving the public with gas we began holding regular monthly meetings. At each of these a little dinner was served to the employees at one of our local hotels. Each meeting was in charge of a different employee. During these get-togethers everything was discussed; our so-called competitors in all fields, the propaganda they had been circulating, our service work, our sales, and in short, everything pertaining to our business in general. Each employee had his or her say and we made it obligatory that each employee should get on his feet and give his views on each phase of the subject under discussion. We always had two ideas in mind,—one having to do with rendering more and better service, the other installing more meters and selling more gas per meter.

At this time the only experienced men in the organization were one installation foreman and the author; the balance of the employees were new to the industry as well as to the kind of service necessary for making satisfied customers. After several of these meetings we began inviting the fitters, gas-makers and others, calling on them for their part of the discussion. We made them feel that they really were playing an important part in the scheme of affairs. Obviously, this made for a greater spirit of cooperation.

As a consequence of the above meetings, we had every employee selling gas to the public, many of them bringing in a prospect nearly every day. During this contact with the public they were able to lay a great many false reports about our gas service and at the same time cultivate the friendship of customers and prospects.

In order that there might be no misunderstanding at the end of our first meter reading period, all of our bills were very carefully gone over and individually checked and we must admit that we had some that seemed unpleasantly high. Accordingly, the following procedure was followed. Each bill was taken into individual consideration and such items as to the number in the family, what their living habits were, what appliances they had, regardless of fuel, etc., were investigated. If after this the bill seemed out of proportion to us, we adjusted it to what we felt was right and sent it to the customer with a good contact man. This man worked as follows. Upon arriving at the customer's home he would inquire for Mr. or Mrs. Jones, as the case might be, and say, "Mrs. Jones, in looking at your bill for gas consumed we find that the same seems somewhat out of proportion for the service we believe you are getting. Although we want to see you use lots of gas and get much pleasure and service from the same, we still want you to feel at all times that you are getting this pleasure and service in the measure in which you are paying. Now we do not believe that you require the amount of gas for your use such as the last meter reading disclosed. This may be due to several instances; possibly your inexperience in using gas or an appliance out of adjustment or further your maid may be a trifle extravagant with the use of your appliances. May I look over your appliances to see that they are all in proper adjustment?"

This of course is highly satisfactory and Mrs. Jones begins to wonder if the appliances are in good condition. After going through the general routine of gas economics so far as the appliance is concerned, our contact man then says to Mrs. Jones, "Now, Mrs. Jones, your bill for the last reading period amounts to $10 and it is our belief that you should not run a bill over $6.00. We have therefore taken the liberty of adjusting your bill for this amount and we would appreciate your kind cooperation for the next reading period and then let us see if you can bring your bill down to that amount, because we would feel better satisfied if the matter worked out this way."

Many gas men reading this will say offhand that it is unusual procedure and one that means a lot of trouble and breeds further trouble, but let me hasten to answer that actual experience has shown that the trouble only occurs during the first month and is not conducive to further dissatisfaction. The reason for this is that Mrs. Jones begins to think in different terms of the gas company; she begins to appreciate that the gas company does not have horns after all and realizes that it is entirely honest and trustworthy. Incidentally, this method of handling high bills has enabled us to pick up new customers for the reason that Mrs. Jones quite naturally tells Mrs. Brown next door as to her pleasant relations with the company.

After the installation of each new meter a follow-up letter to the customer has done wonders in helping matters. Although it is a form letter we make it appear as personal as possible and in it we thank the customer for his patronage and offer our assistance in every way by way of inviting his cooperation in making any suggestions he may have for improving the service. In this letter we also ask them to report to us even the smallest irregularity instead of to their neighbors, so that we may be given first opportunity of remedying the same. We enclose in this letter one of the little books printed by the American Gas Association entitled, "Hints to the Housewife." The letter also tells them how to use their gas service in a safe and economical manner, thereby lessening the effect of the stories that have been circulated to make them timid about using gas service. Due to this and other educational work, we have not had as much as even a complaint from a gas headache and this we feel is rather remarkable in view of all the new customers we are serving who have been unaccustomed to the use of gas. Inciden-

tally we have watched hundreds of our customers' bills grow gradually lower each month until they have reached the conservative figure enjoyed by old experienced gas users.

(*Continued in January issue*)

Merchandising Views and Reviews

TO those who are interested in the sale of self-starting gas heated water service the advertising that the gas man is keeping up, despite the fact that we are facing winter and cold weather, must be very gratifying. Thumbing through the daily newspapers from all sections of the country we were agreeably surprised to find that water heater advertisements are being run in every section of the country. These advertisements as a lot are at least 200% ahead of the brand that the gas man sent out to sell water heaters and hot water service only a year ago. They are so different and interesting that we are reproducing some of them for the elect.

From Dixie comes an advertisement used by the Chattanooga Gas Company. This company we understand has been actively promoting the sale of water heaters for a number of years. A. J. Goss, Manager of the company, as well as C. E. Daugherty, the sales manager, advocate the sale of automatic gas water heaters to increase the gas load per domestic meter. So enthusiastic are these gentlemen that they frequently start a water heater sale with a sun-rise breakfast. The last sale of water heaters conducted by this company was a record breaker. This company builds its selling talk around the bath-room, and features the "30 Days Free Trial" and low down payment, "$5.00 per Month."

The New Haven Gas Light Company has employed the idea of "Clean-Venience" in attracting the attention of the potential purchaser and has used "kitchen atmosphere" to tie in the value of "Perfect Hot Water Service" in connection with dish washing. The low, down payment and the extended monthly payment plan, together with a "Liberal Allowance for Old Water Heater," are the features used by the company.

The Sioux City Gas and Electric Company, (Iowa) features a slogan used by all properties of the United Power and Light Co., "You Can't Be Clean Without Hot Water." We understand that C. A. Nash, Sales Manager of the company, originated this slogan which in our opinion is a very effective one and we will say it has been put-over in a very clever manner in the advertisement reproduced on this page. This company also features the low down payment and the low monthly payment. This company has devised a great many worthwhile merchandising ideas. You may have read how they have made salesmen out of their meter readers.

YOU CAN'T BE CLEAN WITHOUT HOT WATER
Cleanliness is something more than a virtue. It's a badge of self-respect and a foundation stone of health.
Add Convenience to Cleanliness and you have a combination of both . . . "CLEAN-VENIENCE, a word picture of hot water magically sped to opened faucets by RUUD-AUTOHOT.
This water heater is triple-action. It starts itself, stores hot water and stops itself. Automatic!!—it needs no supervision, no thought. Reliable!!—when you're ready, it's ready. Built right!!—to give CONTINUOUS HOT WATER SERVICE. Reasonably priced!!—and sold on terms that bar no income from a daily enjoyment of CLEAN-VENIENCE. See RUUD-AUTOHOT at our showroom so that you may know that this is true.
"CLEAN-VENIENCE—A new way to joy with gas-heated water.
$5 Down
$5 per month
SIOUX CITY GAS & ELECTRIC COMPANY
AND SIOUX CITY PLUMBERS

The Advertisement of the Associated Gas and Electric System, is laid-out, written and illustrated in the mode of the day and is of the type that prevokes the man who is dissatisfied with the "stew-pan or furnace coil" method of securing enough hot water for his morning or evening shave and bath, to get a dealer or gas man on the 'phone to learn how real hot water service may be had.

All-in-all, we would say that the thing to do when building water heater advertising, after having studied these advertisements, is to get in a little *reason why* copy, an illustration of the heater, the amount of the down payment and

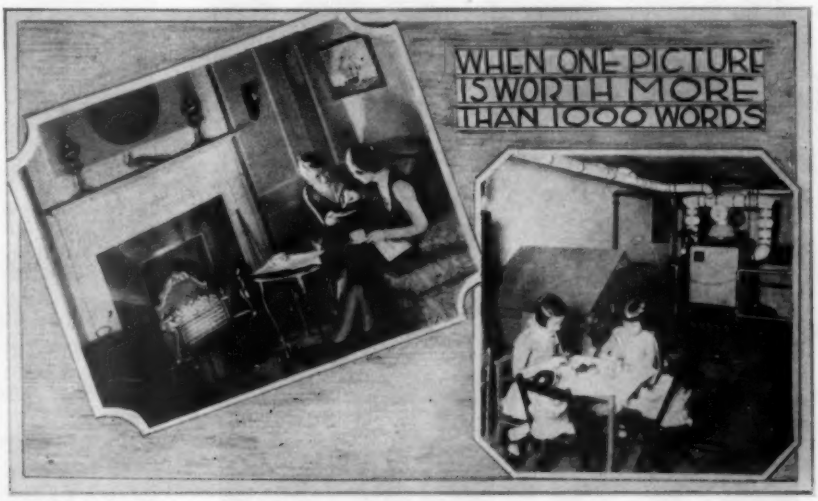
GAS
Can Bathe Them All
PLENTY of hot water for the entire family, available with the turn of a faucet—No running up and down stairs to turn on a non-automatic heater—No waiting for the water to get hot—And no worry about turning the heater off again either—That's Self-Action Gas Hot Water Service.
Just think of the difference this service would make in your own home every day of the year—But particularly right now that the thermometers are soaring to new high levels and hot water is needed at every turn.
You Can't Be Clean Without Hot Water
BELIEVE it or not, but an Autohot self-action water heater will change your hot water troubles to hot water joys. The joy of bathing when the mood is upon you. The joy of shaves that take up the skin, of massages and shampoos, too. The joy of having hot water when and where you want it without as much as a thought about the source of supply.
Try an Autohot in your home this summer. You can't be clean without hot water — and you can't have it conveniently without Automatic Hot Water Service.
Install An Autohot Self-Action Water Heater
30 Days Free Trial
$94.50 Completely Installed
$5.00 a Month
Chattanooga Gas Co.
Public-Be-Pleased Service

the number of months in which the customer is expected to "pay out his account" and as much atmosphere as possible; the atmosphere to also show the "why" of gas hot water service.

CLEAN-VENIENCE
A NEW way of washing dishes and laundering . . . a new freedom from household responsibilities . . . a new road to personal comfort.
All this is offered to you by the
Self-Acting Gas Water Heater
Why not find out . . . TODAY . . . how perfect hot water service can be? Let us tell you the whole story. Let us show you how easy it is for you to enjoy modern hot water convenience in your home.
Have New Joy from Perfect Hot Water Service
ONLY $5 DOWN
Balance 18 Months
Liberal Allowance for Old Water Heater
BE MODERN — USE GAS!
New Haven Gas Light Co.
Salesroom, 70 Crown St.
Phone 5-1101

AN old idea which we recently saw revived to good advantage is the old "Mystery Window" idea. This dealer had taken on a new incinerator and played it up during Fire Prevention Week. Building one of the glorified poster displays in his window, this man then draped a black sateen curtain in front of his window into which he had cut a peep-hole. A white card lettered, "Line forms on this side and everybody will please fall in for his look," finished the show which introduced the incinerators to hundreds of people.

THE Consolidated Gas Company, N. Y. has the happy faculty of putting people into pictures featuring gas appliances "as they are." The two reproduced here from *Telling and Selling* are very excellent ideas of how the Consolidated puts over some of its messages by the use of photographs.



"GIVE me a new idea to use in a gas range sale," writes one of the elect. Brother, "there ain't any sech thing," but here is one that is not what you would call ancient. Offer to trade in old ranges on a pound basis. Haul out your old range catalogues and, from them, work out an allowance per pound, as a trade-in agreement on any oven-regulated range; the amount per pound to be worked out to be equal to an average of $10.00 for the old range. How's that?

SELLING stoves is no different from selling silks or satins. It simply depends upon proper presentation and, as mere man has put it, "on how well you show the woman what your appliance will do for her." In this connection we have heard any number of women say that they never were truly impressed with the value of the automatic gas water heater until they saw how many miles of dishes were to be washed each year.

THE manufacturer of silk screen process show cards and backgrounds has told us that he has contracts to furnish any number of gas appliance manufacturers with dealer helps this year; among these are a range, a water heater and a room heater manufacturer. It is our understanding that these displays, which range from a set of four cards to complete window backgrounds in colors, will be offered by the manufacturer to his dealers along about the first of the year.

TO speed up selling a salesman offers this idea: Have a number of cards displayed about the sales room, shop, and on the desks of salesmen lettered,

"Selling Will Sell," and feature this fact at employee meetings, illustrating the truth of the statement by stories of how certain hard customers were induced to sign on the dotted line.

A SALESMAN who has made a record selling the "above $100" class ranges, when asked how he did it, explained that he forgot price and talked of the beauty, the utility and the saving in fuel, food and foot work to be realized with a new modern range. It's not the price that draws the pen out—it never is. The reason for the price is what puts the signature to the order. It's the artful manner in which the price advantages are offered.

ROBERT M. ANGELL is effectively using a new one, "Keep Hot" water system, in his window display alvertising. In the two photographs of recent displays shown herewith Mr. Angell is making his appeal to the world's greatest purchasing agent and he is making appeals that are very near and dear to the feminine heart; the matter of personal beauty, daintiness and charm. To check and double check on these two displays we laid the photographs out to see what effect they would have on the feminine end of our family. Needless to say, we got a quick come-back. The words "Modern" and "Beauty" with the fashion plate figures brought an immediate strike. We'll bet they did the same thing as window displays.

MODERN MAIDENS...
with their.. air of daintiness and charm.. know the.. value of.. hot water for attractivness.
install a... "Keep Hot" Water System and have plenty of hot water for the whole family

BEAUTY AND ITS ATTENDANT
--BEAUTY-- SPECIALISTS ALL RECOMMEND THE CLEANSING AND HEALING ACTION OF HOT WATER
HAVE ABUNDANT HOT WATER FOR ALL PURPOSES FROM A "KEEP HOT" WATER SYSTEM.

GLENN BISHOP, the display card king, tells us that from the number of demands he is having for "something striking" in display backgrounds and display cards, he is of the opinion that the gas industry will be one of the first to get in stride for the demand for merchandise that is to come with Spring.

"YOU Can Be King"—that's the way the Laclede Gas Light Company opens a radiant gas heater advertisement. And while the average citizen of the U. S. A. has no desire to become a king, particularly the kind that provoked: "Uneasy rests the head that wears the crown," those who are closely questioned do hanker to rule their American castles and rest, read and smoke in comfort, such as is provided by the warm glow of a radiant gas heater. The advertisement has that appeal; also it is interesting to the advertising man because of its unusual layout.

YOU CAN BE KING
A comfortable chair, an interesting book and the soft comforting warmth of a Humphrey Radiantfire will make a castle of any man's home. Put a Radiantfire in your home and know what real contentment is. You can get a genuine Humphrey Radiantfire for as little as $1.80 down and on reasonable and convenient terms
The Laclede Gas Light Company
OLIVE AT ELEVENTH

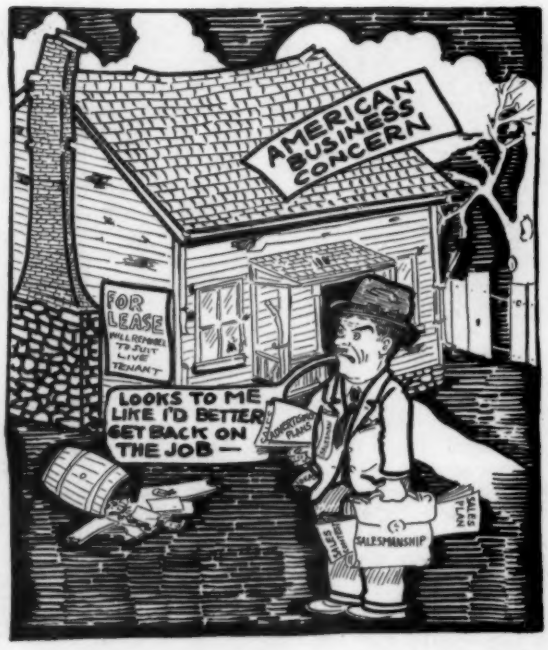
American Gas Association to Establish Testing Station on Pacific Coast

Bearing in mind the thought of further raising the high standards maintained by the industry, the American Gas Association has decided to establish an inspection station of its Testing Laboratory on the Pacific Coast, and it will be located at Los Angeles, California.

It was pointed out by members of the Laboratory Managing Committee that freight and express charges on equipment shipped to the Testing Laboratory at Cleveland for approval are more than twice as high for manufacturers on the Pacific Coast as for concerns located in the Eastern States. However, as it is not planned to establish an Approval Testing Station on the Pacific Coast, this item will be of consequence only when it is necessary for appliances to be returned for correction. Such additional expense, it is explained, undoubtedly could be avoided, at least in part, were appliances given a careful inspection before they are shipped to the Laboratory at Cleveland.

See 'em and You'll Sell 'em

HYLAN PIPER



THE other day we met a man we had not seen since the dark days of 1920. He was having lunch in the coffee shop of a first class hotel where he was putting away real food and he looked like a prosperous person. After a few "how and where have you beens" the conversation drifted to "What are you doing these days?" And can you imagine it, this immaculate person who oozed prosperity was selling sad irons and such, house-to-house, "and making more money than I've made as a regular thing in many moons," he said. "Well how's that," we asked. "We've heard that was a tough racket. Any number of salesmen, (so they said they were) have told us that folks have no money and that they cannot buy. How is it you are making money?"

"It's the old story," he replied, "when folks are not buying, see 'em and you'll sell 'em. That's the way I sized this thing up, before I sold myself this job. I had been pretty good; a road job, salary, expense account and all that and things were going along O K M and X 'till early last summer when one day I received a wire that called me into headquarters. There I was acquainted with the fact that things had gone haywire.

Results of a Rest

"Well to make a long story short, me, a high-pressure man grown soft, was out of a job. However, I had a little kale, knew I was good, it was hot and I needed a rest, so I resolved to just take things easy until after the summer months when I'd go out and pick my job. I figured a week or two away from the old gags would do me good. Strange to say while pleasure bent I found I was not the only fellow who had free-time. Big business it seemed sensed a slump, they'd been looking at production records, talking foreign retaliation, studying sales charts, expenses, advertising, and consumer saturation. Everybody was howling 'hard times are coming' and shake-ups were the order of the day.

"Salesmen were all talking 'nobody's got any money' and I began to do a little worrying and watchful waiting for a job to my liking.

"I talked to everybody I could get to talk to me and, from all, I got about the same story; 'Folks haven't the money and you can't sell anything.'

"That was hard on me, for selling was all I thought I knew and peculiarly, that is one of the things I'd forgotten. However, I went on talking and visiting until my bank account began to dwindle. The more people I talked to the more dire became the story of conditions, and I was talking mostly to selling men. It sure looked bad. However, I finally got a break, I met an old friend who told me that my present employer was looking for a man —to sell house-to-house. I listened, but to be honest that house-to-house stuff did not appeal to me very strongly. I had graduated from that sort of work years ago and I decided that I'd pass-up the opportunity.

"Door-bell ringing and cold canvass selling held no romance for me. I had won membership in 100% and 200% Clubs. However, I did not fall into anything and I was unable to pick that 'other job.' Everywhere I went I met men who were out of a job or were so afraid that they would be that I fell into the habit of doing a little mental arithmetic on house-to-house selling. The result was that I decided to again enter that phase of selling and to make good. I applied for the job, got it and was given ample time to study the line I was to sell. And here I am, happy, making money and learning more about selling than I ever dreamed there was to know."

The manner in which this man makes money is no secret to any number of men who are making good selling home appliances today; but for those of you who have not guessed how he does it we are going to elucidate right now; he is making just twice as many calls as his boss expects him to make, he's seeing 'em and he's selling 'em.

When after many night battles with his false pride, this man finally decided to enter house-to-house selling, he cast off all his ballyhoo, his bag of tricks, his hair-trigger methods and devoted his spare time to *learning why* home managers should buy the things he had to sell. He gave every appliance he could get his hands on the third degree. He studied it inside and out and when time went on he could not be stumped, he knew that the wares he offered prospective customers were needed, he further understood what they were needed for and why. Once he arrived at the conclusion that there was a need for an appliance he proceeded to pull door bells and tell home managers about it. He carried an iron, right out in the open. This created interest, interest gained an audience and a demonstration and the demonstration usually resulted in a sale. His iron had "a do-dad that prevented over heating; a feature this and that, was pointed right and plated bright, the plug and cord—and you pay only 85c now etc." It went so well that before he knew it he was a specalist on home management problems and was making more money than his boss.

This man through accident uncovered the "priceless ingredient," that thing that made a lot of fellows sales managers and carried them into executive positions.

In the old days of the industry, when gas men went out to sell a black gas range, a copper reflector, pipe burner or cone type room heater, arc light or tank heater, they did so with a message of *what it will do for you* and that is the type of selling that is needed today.

Gas Business Okeh

There is nothing the matter with the gas business, we still believe the industry is entering a new era. The fly in the ointment is that a vaunted, high-stepping brand of salesmanship with a superficial knowledge of what an appliance will do for the customer, is taboo, not in tune with the times. This is the day when appliances or any other merchandise must be sold.

Gas appliances have been tuned to the modern tempo; they are efficient, well constructed, good to look at and reasonable in price. Sales helps in advertising have been modernized; in short, there is plenty of merchandise suitable for a sophisticated age and what is

needed is old time selling methods, the type that *sees 'em.*

Manufacturers are meeting new conditions with new merchandise—but salesmanship has forgotten or frowned on old fundamentals. It must be remembered that human nature has not changed and while a goodly number of folks appear blasé that is only a veneer and the same old appeals that were used to sell the first gas ranges—pride of possession, convenience, comfort, economy, newness and keep-up with the Joneses, will sell the modern appliances of today, come what may,—rain, snow, hail or Jewish holiday,—if the seller will see 'em.

It's time to see 'em now and sell 'em a basement full of helps for the home manager for Christmas. Make just twice as many calls as it has been your habit to make and you will not have much time to worry about conditions and the fellow who brings in the orders need not fear that his pay-day may become passé.

Attractive Xmas Window designed by Consolidated Gas Co. of New York

Consolidated of New York Award Bronze Plaques for Outstanding Safety Records

Announcement was made recently that the safety program of the Consolidated Gas Company of New York and affiliated gas companies will be further stimulated by the awarding of bronze plaques to all departments completing one year without a lost-time accident. Six departments of the company have already achieved this record and have received plaques, according to John Stilwell, vice-president in charge of industrial relations.

The outstanding records of the company were established by the Customers' Service Shop at Elizabeth street, with three years and four months without a lost-time accident, and the Ravenswood manufacturing plant, with three years and one month. The other departments completing a record of one year or more are the 66th Street Customers' Service shop, the Northern Union Gas Company shop, the East River Gas Company shop, and the New York and Queens Gas Company shop.

The Elizabeth street shop has an average of 125 men; the Ravenswood plant, 101 men; the 66th street shop, 173 men; the Northern Union shop, 122 men; the East River shop, 67 men; and the New York and Queens shop, 57 men.

The purpose of the plaque is to reward the outstanding safety records of the various departments, and at the same time to stimulate continued efforts for accident prevention on the part of every employee, Mr. Stilwell stated. Space is provided on each plaque for the addition of a suitably engraved plate for each additional year without an accident.

The inscription on the plaque states: "The prevention of accidents minimizes the sufferings of humanity, conserves the Nation's manpower, and husbands the resources of industry."

BOOK REVIEW

Piping Handbook, by *J. H. Walker and Sabin Crocker.* Published by McGraw-Hill Book Company, New York, 1930. 763 pages. Price $5.

"The purpose of this book is to provide authoritive and accessible data for the engineer interested in piping work. The increasing importance of piping systems in modern power plants, in distributing systems, and in industrial operations, and the specialized nature of the problems involved, justify a handbook devoted exclusively to the subject."

The authors have succeeded admirably in their efforts to reach the object above quoted from their preface. The volume contains material drawn from many sources and assembled in a convenient fashion for reference use. The first portion of the volume is devoted to fundamental principles of fluid flow and the handling of fluids. This furnishes an excellent basis on which to present the more practical detail of materials, equipment, and methods described in the latter half of the book.

Engineers of the gas industry should not look upon this volume as in any sense a manual of gas handling. Nevertheless, it contains a great deal of engineering material directly applicable to that phase of gas engineering and much material which gives prospect of being very useful in the works, the power plant, and other parts of the industry not commonly under the immediate supervision of the distribution man. Hence, engineers engaged in production activities should consider it prospectively a valuable addition to their libraries, quite as much as should the distribution engineer.

Patents, Trade-Marks, Copyrights *By Oscar A. Geier. Cloth-bound 6" x 9", 128 pages, published by Richards & Geier, Patent and Trade-Mark Attorneys, 274 Madison Ave., New York, N. Y.*

Readers of American Gas Journal will be interested to know that arrangements have been made with the publishers of the above book to mail a free copy to interested parties, who apply to either this office or to the publishers— Richards & Geier.

The book is written in terms the business man can understand, and covers the essential features of our Patent, Trade-Mark and Copyright Laws.

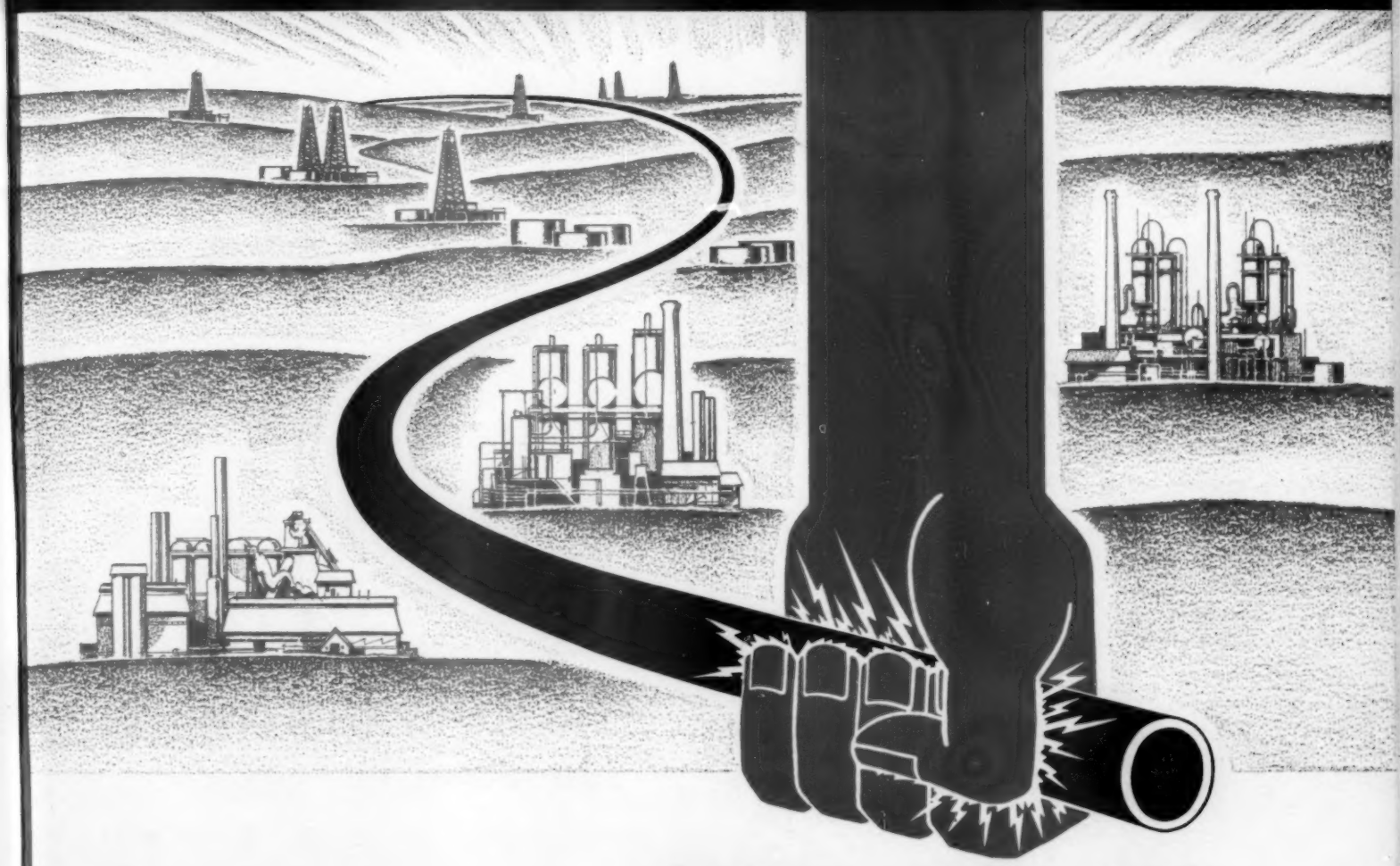
The Patent Law section of the book explains who may obtain a patent, what may be patented, the importance of specification and claims, patent interferences, reissues, appeals, infringements suits, etc.

The Trade-Mark end of the book covers trade-marks in general, valid trade-marks, invalid trade-marks, unfair competition, state registration, interferences, oppositions, appeals, infringements, etc.

This fifth edition has been completely revised and brought up-to-date to conform with the changes of the law and practice since the fourth edition was issued in August, 1928.

In addition to facts about American patents and trade-marks, this book also gives a large amount of information about the foreign patents and trade-marks which will be of particular interest to manufacturers who export. The index, with which it concludes, affords ready reference to the many important subjects treated in this book.

30 *to* 40 MILES *of* FINISHED PIPE EACH DAY...



REPUBLIC *ELECTRIC WELD* PIPE

MADE BY A NEW PROCESS
CONTROLLED EXCLUSIVELY BY
REPUBLIC STEEL CORPORATION
YOUNGSTOWN . OHIO . . . . .

RECORD PRODUCTION TO MEET A RECORD DEMAND

You should know the facts—

Twelve months ago Republic Electric Weld Pipe was an experiment—a bold experiment. The first mill to produce standard weight pipe by the resistance welding process was in successful operation on small sizes of pipe. The big question was, "Could the larger sizes in active demand be produced by the same method?" Those responsible for the development of the new process said "Yes," and backed their judgment with a ten-million dollar plant.

Thirty to forty miles of finished pipe now produced daily by this huge mill attest the vision of these business pioneers. Into oil, gas and gasoline lines, into factories and into buildings goes the output of this most modern pipe making plant. And as production increases, demand grows even faster, for this unusual pipe offers many advantages:

THE WELD—stronger than the parent metal—guaranteed 100%—with no foreign metal added—and smooth inside and out.

THE PIPE—perfectly round—of uniform wall thickness—all scale and oxide removed inside and outside—easy to weld and bend—in sizes 4 to 16 inch and lengths up to 50 feet.

REPUBLIC STEEL CORPORATION
YOUNGSTOWN, OHIO

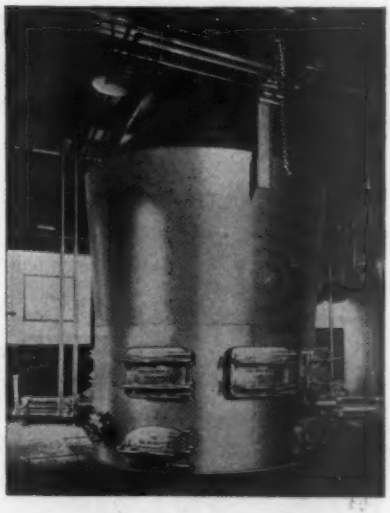
REPUBLIC ELECTRIC WELD PIPE

MADE BY A NEW PROCESS
CONTROLLED EXCLUSIVELY BY
REPUBLIC STEEL CORPORATION
YOUNGSTOWN . OHIO . . . . .

EQUIPMENT NEWS

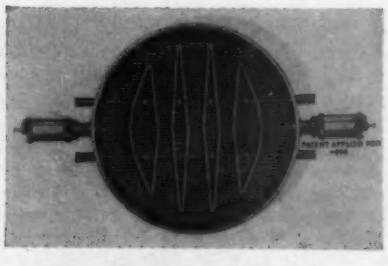
New Mechanical Grate for Water Gas Generators

The Gas Machinery Company, Cleveland, Ohio, recently put on the market a new type of mechanical grate for water gas generators. The illustration shows the external parts of this mechanical



grate as applied to a generator furnished with a new 11 ft. set. The generator is 11 ft. 6 in. in diameter at the top but has a tapering shell and lining and is 10'6" in diameter at the grate line.

The principle involved in the action of this mechanical grate is to agitate the generator fire sufficiently to keep the ash and small clinkers coming through to the grates without having an opportunity of lying in a dormant state in the hot fire zone long enough to fuse together and form large sized clinkers.



The mechanical features involved are a multiple of drag bars made up in special shapes. The drag bars are made up of bars 2" in cross section and attached to the draw bars by lugs welded to the draw bars. The draw bars are carried on the grate supporting structure and are made of the same depth as the grate bars.

The two draw bars are connected at each end by a cross head, which in turn engages the piston rods of the hydraulic cylinders. In the larger size generators two hydraulic cylinders are placed directly opposite each other and with the hydraulic pressure applied at opposite ends of the cylinders furnish the power for moving the draw bars.

Another feature permits the discharge of ash and small clinker over the outer edge of the grate as well as between the grate bars. The grates are placed at an elevation below the steel ledge and extend under same a sufficient distance to provide an angle of repose and insure against the ash passing over the outer edge of the grates, excepting through the action of the drag bars.

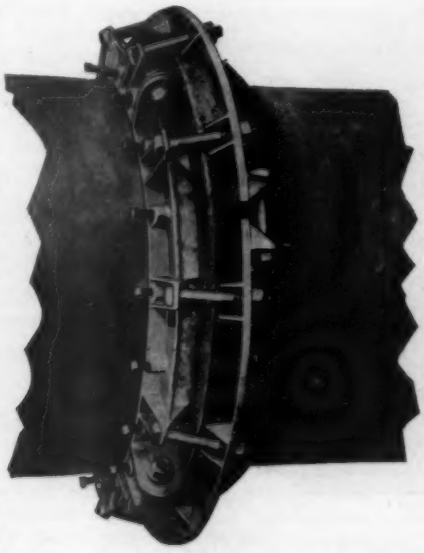
The hydraulic pressure to the cylinders is controlled by a four way cock placed on a stand on the operating floor and conveniently located for the operator.

An indicator, for showing the position of the drag bars at all times, is also located on the operating floor conveniently placed for observation.

Descriptive matter on the new grate will be mailed on request.

Bell and Spigot Pipe Repair Clamp

The M. B. Skinner Company, South Bend, Ind., recently issued Catalog No. 29, which illustrates and describes their line of pipe repair clamps. The illustra-

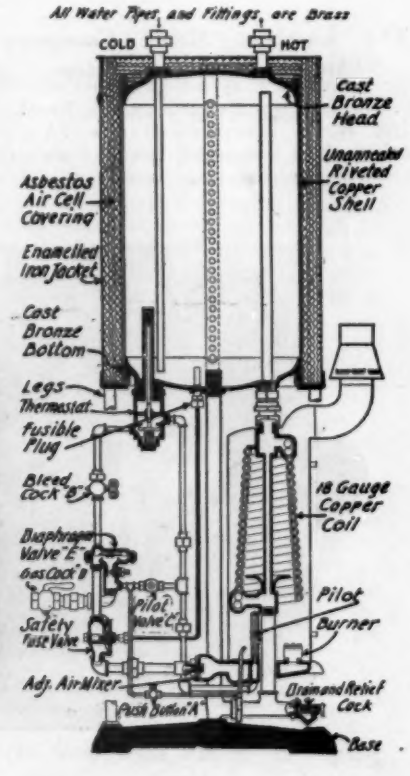


tion shows a clamp for stopping bell and spigot joint leaks and particularly leaks due to vibration which develop where gas mains run under railroad tracks or street car tracks, over bridges or viaducts. The rubber gasket is confined under heavy pressure and sealed from the atmopshere. It is claimed that this clamp not only stops the leak for the moment but accommodates itself to all conditions. The seal ring is a strip of soft brass made up with the outer edge shaped to a lip, which guides the gasket directly into the leak. This seal ring sliding with the rubber gasket and being flexible enough to conform to any irregularities in the face of the bell, forms a seal between the rubber and the atmosphere. These clamps are made of malleable iron.

The Catalog also describes their Collar Leak Clamp, Emergency Pipe Clamp, Pipe Line Clamp, High Pressure Saddle Clamp, Heavy-Duty Service Saddle and Band Clamps, designed particularly to stop pinhole leaks in gas lines. Chapters are also devoted to describing the Skinner Combined Reseating Tool, Valve Reseating Tool and Pipe Benders. A copy of the Catalog will be mailed on request.

Stratification in Hot Water Heater

The Kompak Company, New Brunswick, N. J. state that one of the factors which determines the capacity of a storage water heater in reference to the



usable hot water at the faucet, is stratification, which in this connection means the complete separation of the heated water from the incoming cold water, so that at no time is there a tendency for the two to mix and cause a condition of

lukewarm water in the tank before the available heated water has been used at the faucet. In their exhibit at the A.G.A. Convention at Atlantic City, they used a glass demonstrator which indicated the circulation of water from the bottom of the tank, through the coil to the top, very clearly, and stressed this particular feature of stratification.

More specific details will be mailed on request.

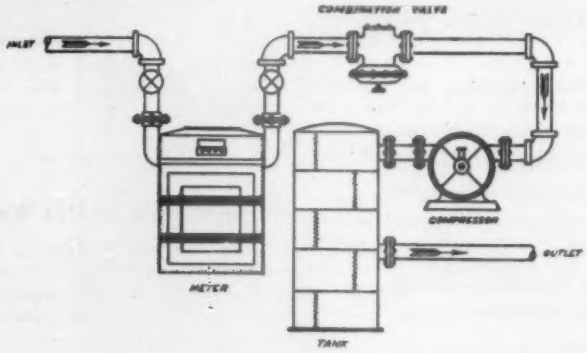
New Combination Valve

The Connelly Iron Sponge & Governor Company, Elizabeth, N. J., recently put on the market a new Connelly Combination Valve for back pressure and vacuum. They state that, "Wherever gas-fired industrial equipment has been installed, it has been found that a back pressure of two or more pounds is exerted against the outlet of the meter every time that the compressor is shut down.

"To guard against this we have developed the Combination Valve, which consists of a back pressure valve and a diaphragm-actuated vacuum valve in one body completely self contained. This operates positively and instantaneously the moment any back pressure or vacuum rises in the line or back to the meter."

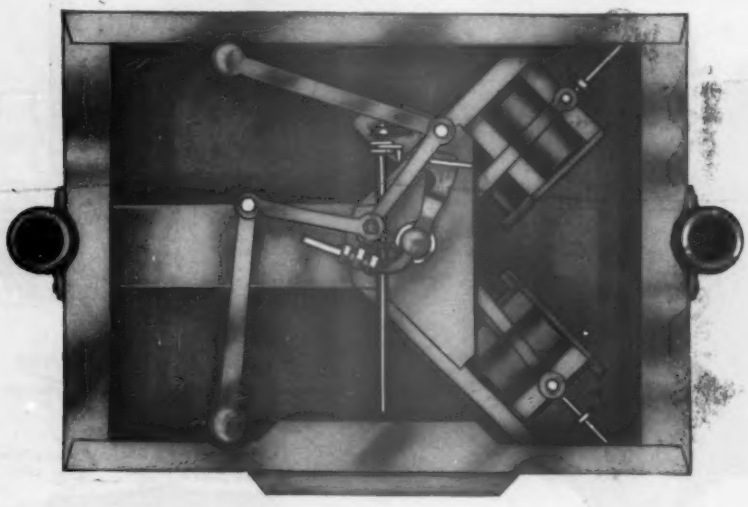
The illustration shows the hook-up of the valves in the gas line. They can be used on all small as well as large installations.

Further details will be mailed on request.



The Lambert Meter Company Announces a New Meter

The Lambert Meter Company, Brooklyn, N. Y., announces a new 5A-175 meter. It is a standard meter of standard dimensions and interchangeable parts, but it is claimed, with so many improvements that longer life and more continued accuracy may be expected from it.



Some of the features are — weight, 16¾ lbs., capacity 235 cu. ft. per hour, although rated 175 cu. ft., central rib in grating to overcome squeaking, larger stuffing boxes, stronger flag rods, nonbuckle discs, semi-chrome diaphragms, reinforced flags, patented rockshaft brackets, pan bottoms, soldering and sweating in of interior seams, retinned bottom edges, monel metal overcast valve arms, monel metal cover wires, monel metal rockshafts, newly designed simple adjustable tangent, silent reversible acting meter backstop, four circle index, ¼" plate glass index glass, reinforced flag arms and bronze drop forged side pipes.

The Lindeweld Process

A new method of oxy-acetylene welding known as the Lindeweld process has been introduced by The Linde Air Products Company, 30 East 42nd Street, New York, N. Y., as a part of its process service. This new process has met with great success in the field of overland pipe line construction, where it is being used increasingly because of the remarkable speed and economy which it has made possible.

In the welding of pipe for oil and gas transmission, the Lindeweld process has resulted, it is claimed, in savings of from 30 to 60 per cent of the time required to make a weld by the methods previously employed, depending upon the size of the pipe. Oxygen and acetylene consumption have also been reduced considerably.

It is also stated that consistently higher strength welds are obtainable than by any welding process previously employed so that no sacrifice of quality has been made for the benefit of the increased speed. In tensile tests made in the field on specimens welded by the Lindeweld process, the welds have invariably outpulled the pipe. Good ductility has also been shown in bend tests.

20-in diameter natural gas pipe line welded by the Lindeweld Process being cold bent

The Lindeweld process depends essentially on a new method of blowpipe manipulation and upon the use of a new welding rod introduced for that purpose, known as "Oxweld No. 24 Lindeweld Process Welding Rod." Experienced welders, it is said, find no difficulty in adapting themselves to the new method. The Lindeweld process is also more quickly learned by student welders than the former welding method.

More than 300 miles of high pressure pipe line welded by this process are now in the ground. The illustration shows a 20-in. diameter natural gas pipe line which has been welded by the Lindeweld process being cold bent to fit the contour of the terrain—an exacting test of the strength and ductility of the welds.

NEWS OF THE GAS INDUSTRY

Installing Gas Plant

The Natural Gas Company of Oregon, a subsidiary of the Standard Oil Company, is installing a gas plant in La Grande. Eighteen miles of main have already been laid, and the plant is expected to be ready for operation within sixty days. It will use a seventy-five H.P. motor, twelve K.W. for heating and two K.W. for lighting.

Granted Franchise

The Springfield, Mo., Gas and Electric Company was granted a franchise recently to serve natural gas in that city. This company is one of the Federal Light and Traction properties acquired last spring by the Cities Service Company.

Drill for Gas

A closed Wisconsin corporation is now drilling for natural gas in Kentucky, according to officers of the company, which has recently been organized.

Midwest Natural Gas Co., Milwaukee, Wis., with 12,500 shares of stock at $100 each, has leased more than 700 acres of land prior to the opening of operations a few weeks ago.

The officers of the company are: Chas. W. Nebel, president; William Pabst, vice president, and G. W. Slaughter, secretary and treasurer. The above, with Fred Ellis and Chas. Bareis are members of the board of directors.

Memphis Gas Sales Increase 53%

A 53 per cent. increase in sales of natural gas for the first ten months of this year, compared to the same period of last year, is shown by the comparative sales report issued by Memphis Natural Gas Company, 46 per cent. of the common stock of which is owned by Appalachian Gas Corporation. Sales to Oct. 31 this year were 7,097,431,800 cubic feet, against 4,628,966,873 cubic feet last year, an increase of 2,468,464,927 cubic feet.

Gas Franchise Approved

The Moody-Seagraves Company, a subsidiary of the United Gas Company of Houston, Texas, has accepted the gas franchise of the city of Opelousas, La., which calls for the piping of gas in the homes and industries within the next 12 months.

Plans have been completed by the Moody-Seagraves company to pipe gas into more than 50 towns in southwest and central Louisiana at a cost of approximately $6,000,000. The first work to be taken up by the company will be a thorough survey of the airline from the source of supply near the Texas-Louisiana border through various places to be served. This route has been tentatively laid out by air survey but engineers will supplant this report with actual lines.

Authorize Bond Issues

Bond issues totaling $17,750,000 by the Northern Indiana Public Service Company were authorized by the Indiana public service commission at a recent meeting. The utility will pay $44,375 to the state in fees for the issues.

Two issues, one for $14,000,000 and the other for $3,750,000 are to reimburse the company's treasury for improvements made during the past few months. The larger issue will be first and refunding mortgage gold bonds bearing 4½ per cent interest.

Gas Plant Enlarged

Capacity of the Kerrville, Tex., Gas Company's plant, completed last spring, will be increased by equipment, installation of which will be completed about November 15, according to an announcement from J. H. Thompson, plant manager. An auxiliary engine, compressor and storage tank will be added to take care of emergencies and future growth, and numerous smaller improvements will be made.

Increased Industrial Activity Indicated by Sharp Sales Advance of Allegheny Gas

Large comparative increases in sales reported for the past several months by Allegheny Gas Corporation are continued with the September report, which shows the highest monthly gain so far recorded, amounting to more than 70 per cent. over September of last year.

Sales of natural gas during September of this year were 181,960,000 cubic feet, against 106,959,000 cubic feet a year ago. Allegheny Gas Corporation supplies natural gas to a number of important industrials and utilities, and the sharp rise in September consumption is indicative of a marked increase in industrial activity. Some of the larger customers are United Fuel Gas Company and Huntington Development and Gas Company, subsidiaries of Columbia Gas & Electric Corporation; South Penn Oil Company, Owens-Illinois Glass Company, Libby-Owens-Ford Glass Company, Pittsburgh Plate Glass Company, Lamb Glass Company, Hope Engineering Company and Cooper-Bessemer Corporation.

United Gas Announces Expansion

The United Gas System has announced a $20,000,000 expansion program of which $8,500,000 has been authorized for immediate improvements on transmission and distribution facilities. These facilities will consist of more than 350 miles of new lines costing about $7,250,000, laid from fields to distribution centers; new distribution systems placed in eight towns; and the construction of three new compressor systems; and numerous smaller improvements.

The largest outstanding expense of the system will be the improvement to better gas service of Houston and surrounding territory. This betterment, on which construction has been started, looping the transmission line of the Houston Gulf Gas Company system from Refugio to Houston, is estimated at $3,360,000.

Duquesne Gas Corp. Continue Drilling Operations

Duquesne Gas Corporation is now drilling on eleven locations in Green, Fayette, Westmoreland and Washington Counties, Pennsylvania. Since the beginning of the year, the Corporation has completed sixteen natural gas wells and two oil wells. The total number of producing wells is now one hundred and sixty four.

Add to Original Outlay for Expansion Work

The Central Indiana Gas Company has added $250,000 to an original outlay of $1,000,000 for expansion in 25 cities and towns in Indiana and the present force of 500 workers will be increased to 800. The additional money will be spent in the district comprising Anderson, Elwood and Alexandria.

First Gas Well From Sundance Sand

The first commercial production of natural gas from the Sundance sand in the Baxter Basin of Wyoming was brought in by the Mountain Fuel Supply Company, October 11. The well is 3,466 feet deep and the flow is estimated at three and one-half million cubic feet.

Gas Division Point Named

New Braunfels, Texas, has been made the division office of the Southern Gas Utility Company, according to an announcement made by officials of this concern. The purpose of locating the offices at this point is because this community is more centrally located and can serve a larger territory.

Nearby towns served through the Southern Gas Utility Company are Seguin, San Marcos, Schertz, McQueeney, Hondo, Converse, D'Hanis, LaCoste, and one or two very small communities. Those served through the Southwestern Distributing Company are Nordheim, Runge, Yorktown, Kenedy, Karnes City, Poth. Falls City and Floresville.

File Articles of Reorganization

Articles of reorganization have been filed with the secretary of state in Indianapolis by the Hoosier Gas and Light Company having a principal place of business in Greensburg, Ind. The corporation has an initial capital stock of 10,000 shares having no declared par value and is formed to produce and distribute natural gas. The first board of directors is composed of A. E. Pierce, W. M. McFarland and B. E. Mauer.

Texas Gas Utilities Brings In First Well to Supply New Territory

The first of five additional natural gas wells being drilled by Texas Gas Utilities Company on its Zavala County, Texas, holdings, to supply gas for market demands in territory being opened up by construction of new pipelines, has been brought in at a depth of 1,211 feet, according to announcement made by Appalachian Gas Corporation, the parent company.

The new well will be connected to the main pipeline serving the city of Uvalde, and will also supply the new pipeline now under construction which will extend to Crystal City, Carizzo Springs and the "Winter Garden" District of Texas. It is expected that the latter area will consume a large volume of natural gas as fuel for irrigation pumps.

Standard Gas & Electric System Report Increase in Sales

Indications of fairly active business conditions were found in reports for the months of August and September from commercial managers of the subsidiary and affiliated companies in the Standard Gas and Electric Company system, according to W. H. Hodge, vice president and manager, sales and advertising department, Byllesby Engineering and Management Corporation.

Dollar volume sales of appliances at all properties for the eight months ended August 31 showed an increase of 4.69 per cent over the same period for last year. Although August sales by some of the companies were somewhat under the figures for the same month a year ago, Mr. Hodge points out that wherever special efforts were put behind an activity, the results were usually satisfactory. Particularly good results were obtained from efforts to add new lighting load.

Convention Calendar

December

9-12 Tenth Annual Gas Meter Short Course and Conference, under joint auspices of the Mid-West Gas Association and Iowa State College, Ames, Iowa.
R. L. Klar, Mid-West Gas Association, Sioux City, Iowa, Chairman.

February

3-5 New England Gas Association, annual convention, Hotel Statler, Boston. Mass. C. D. Williams, executive secretary, 41 Mount Vernon St., Boston.

April

16-18 Missouri Association of Public Utilities, Excelsior Springs, Mo. Jesse Blythe, 103 West High Street, Jefferson City, Mo., assistant secretary.

28-30 Pennsylvania Gas Association, annual spring meeting, Galen Hall, Wernersville. Pa. Frank W. Lesley, secretary, 127 W. Market Street, York, Pa.

Announce Plans for Gas Service

Plans of the Northern Indiana Public Service Company for providing gas service to New Haven, Ind., have been announced by H. E. Vordemark, division manager at Fort Wayne. New Haven will be served from a four-inch high pressure gas line from Fort Wayne. Work on the line and on the construction of a distribution system at New Haven is to start as soon as materials can be found.

In addition to serving New Haven, the pipe line will make gas service available to all residents between Fort Wayne and that place. The line will be laid along the route of the Fort Wayne-Lima Railway Company Gas, for this new extension in service will be supplied from the modern gas manufacturing plant of the company which has ample capacity to provide for the growth of the city and surrounding territory.

Richwood, Va., Gets Natural Gas

The Hope Natural Gas Company recently completed the gas line into Richwood, Virginia, and are now serving that town with gas. Among the wide range of activities included in the official opening of the company's service, was a four day natural gas cooking school conducted by Mrs. Luella Fisher, home economics expert, a banquet for representative citizens and the opening of the local office and sales room.

Project to Establish American Standards Basic Requirements for Gas Appliances Announced

A new project for the establishment of American Standards for the basic requirements of gas appliances has just been announced by the American Standards Association. The project will be placed in the hands of a technical committee under A.S.A. procedure at the request of the American Gas Association which will direct the technical work of the committee.

The scope of the work as agreed upon by the American Standards Association and the American Gas Association is the "establishment of minimum or basic requirements for performance, safe operation, and substantial and durable construction for domestic gas burning appliances; together with laboratory methods of test for determining compliance therewith."

A committee of the American Gas Association has been working on this subject for a number of years. This committee, enlarged to assure balanced representation of producers, distributors, consumers, and other important groups will now continue this work under A.S.A. auspices. Acting under the chairmanship of Mr. R. B. Harper, of the Peoples Gas Light and Coke Company, Chicago, Illinois, the committee will include representatives of:

U. S. Bureau of Standards, U. S. Bureau of Mines, U. S. Department of Agriculture, U. S. Public Health Service, U. S. Bureau of Home Economics (Department of Agriculture), American Home Economics Association, Master Plumbers' Association, Heating and Piping Contractors National Association, five individual gas companies, seven individual gas appliance manufacturers.

Permission Granted to Build Gas Distribution System

The city council of Chester, S. C., at its regular meeting recently adopted an ordinance granting to the Southern Public Utilities Company a franchise to build and operate a gas plant and distribution system in that city.

Announce Removal of Offices

The Central Public Service Corporation recently announced the removal of their executive offices to 224 South Michigan Avenue, Chicago, Illinois.

(News Continued on Page 82)

» SHOW YOUR CUSTOMERS HOW TO REDUCE THEIR GAS BILLS » » »

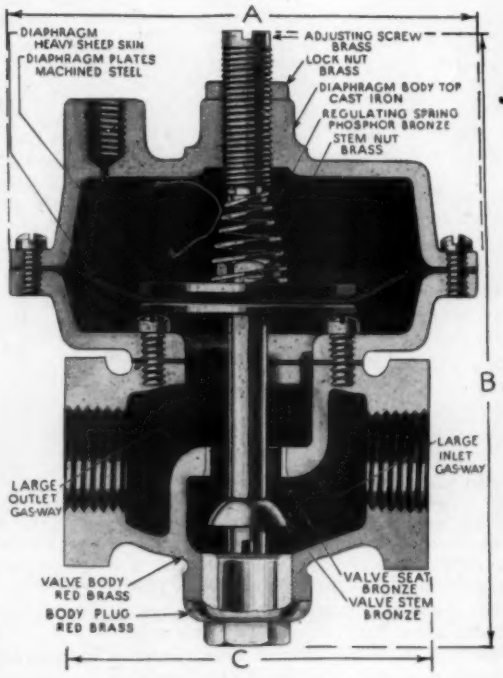
Tell your customers you have a way to save them money by reducing their gas bills—and they will listen.

Tell them how frequently it's necessary for the Gas Company to deliver GAS, the ideal fuel, to their meters at higher pressures than required by conversion burners, hot water heaters or kitchen ranges, etc. Sometimes as high as 6 to 12 inches water column pressure, in order to meet peak requirements—whereas the American Gas Association recommends burning the GAS at about 3½ inches in such appliances. Therefore, they at times are wasting gas—if no pressure regulator governs the varying pressures in their house supply lines.

Tell them that often a BARBER Superior Gas Pressure Regulator, to keep the gas pressure for all appliances at an even and constant 3½ inches pressure will pay for itself one or more times over in a single year. And that it will continue such saving for many years, since there's nothing about it to get out of order or wear out.

This is constructive selling—and it's profitable, as many gas appliance merchandisers will tell you. For it means more than the sale of BARBER Regulators; it affords opportunities to inspect appliances and recommend replacements and new equipment. It has led to thousands of orders for BARBER Automatic Gas "Conversion" Burners and other gas appliances.

This proved business builder makes satisfied gas users. We shall be glad to co-operate with you to the fullest extent. Write for the complete sales plan, prices and attractive discounts.



Sectional view of the BARBER Regulator. Valve body is made of red brass with all brass working parts. Super-accurate—and permanent. The BARBER Superior Gas Pressure Regulator is a precision device in every respect —at a price so moderate as to make its sale easy.

TEST OFFER

We will gladly send to Gas Companies and appliance manufacturers sample Barber Regulators upon memo invoice for test purposes. Simply advise the sizes desired.

BARBER Superior Gas Pressure REGULATORS

THE BARBER GAS BURNER CO.

3702-04 Superior Avenue
Cleveland, Ohio

Formerly The Cleveland Gas Burner & Appliance Co.

A Difficult Undertaking

The interest of the entire natural gas industry, and especially engineers, will be centered upon the construction of the Pensacola Division of the Southern Natural Gas Corporation, which is now underway.

The line will be sixty-seven miles long, reaching from Mobile to Pensacola. The interest of the engineers will be due to the fact that the line will traverse about fourteen miles of swamp beginning at a point approximately one and one-half miles west of the L. & N. R. R. crossing at Bayou Sara. This swamp, which is almost impenetrable, literally swarms with alligators, venomous reptiles, bears and insidious insects. Aside from this feature of construction difficulty, the actual laying of the pipe line for natural gas presents a problem probably unlike any that has been met in the industry.

This swamp begins abruptly. The terrain changes almost without warning from sandy clay to river silt, which lies about twenty feet deep above the sand. Trees, brush, decayed vegetable matter and grass almost as strong as whipcord form a mat which floats on top of the river silt. From the very point of beginning up to Bayou Sara there is a succession of small streams, ponds and bogs. The timber is extremely dense, surveyors having found it impossible to progress except after advance crews had traversed the right of way and cut a path for those following behind. The timber consists of cypress, Tupelo gum, oak and some hard wood. The line will follow the L. & N. right of way across the swamp to the east side of the Tensas river at a distance of approximately one hundred five feet north of central line. The level of the swamp is about one foot above the ordinary level of the water in the Bayous and river. At this time the Natural Gas Engineering Corporation, which concern will have charge of the construction, believe that it will be unnecessary to bury the pipe across the swamp. Instead, a double line will be laid and a regular river clamp will be used at each joint to hold the pipe in place and to prevent the river currents, during high water, displacing or breaking the line. In order to thoroughly safeguard the City of Pensacola and surrounding territory there will be four stream crossings of multiple lines where the twelve inch line will be broken down into six inch pipe, i.e., one at Bayou Sara, one at Canot Creek, one at the Mobile river about nine hundred feet long and one at the Tensas river about three thousand feet long.

The task of the Natural Gas Engineering Corporation will be made more difficult by reason of the fact that in the swamp it will be impossible to use machinery such as is usually utilized in pipe line construction. Another difficulty will be in distributing the pipe along the right of way, and it is expected that either brush mats or planks will be provided at points along the right of way for the men to work on and to keep them from sinking out of sight in the soft mush. And it is expected that this construction will be the first in the history of the projection of natural gas lines where it will be found necessary to provide houseboats for the crews to live in while engaged in this perilous task of carrying natural gas to the Florida peninsular. No camp site will be available for several miles, and provisions will be made to house the men on the surface of the water.

Natural Gas Engineering Corporation announced today that the first work to be done of the entire sixty-seven miles will be that of meeting and mastering the insidious risk involved in negotiating this crossing. The remainder of the work is not looked upon as being one out of the ordinary run of pipe line construction. Unless unforseen difficulties are encountered, natural gas will be provided the local gas company for distribution in Pensacola by December first, and it will also be available for use in industries operating nearby.

Gas Franchises Awarded

The Colorado Natural Gas Company who are building a pipe line from Stevens county natural gas field to the city of Colorado Springs, where they will sell gas to the city, have been given a franchise to serve the following Colorado cities, which are enroute, with natural gas: Ordway, Sugar City, Crowley, Olney Springs and Manzanola.

Constructing Pipe Line to Increase Sales of Natural Gas

Victor Gas Company, subsidiary of Duquesne Gas Corporation, is constructing a pipeline in Fayette County, Pennsylvania, which will enable the producing corporation to increase its sales of natural gas to the Monongahela West Penn Gas Company, a subsidiary of the West Penn Electric Company with which Duquesne Gas Corporation has a long-term gas contract.

Topeka Company to Start New Construction Soon

The Capital Gas and Electric Company at Topeka, Kansas, soon will start on a big construction program designed to augment the supply of gas to the entire distribution system at that city and especially to provide better service to the South and West side of the city. The new construction is expected to cost about $180,000.

Gas Company Offices in Jasper

Offices of the Southwestern Distributing Company, a subsidiary of the Dixie Gas and Fuel Company, have been established at Jasper and Kirbyville, Texas. In addition to regular office routine, gas appliances will be handled and a repairing and installation department maintained.

Both offices will be in charge of Mrs. B. C. Teer.

Northern Indiana Public Service Company Seeks Permission to Change System of Billing

Rate schedules under which it is proposed to bill customers in Hammond, East Chicago, Whiting, Michigan City and adjacent suburban communities on the basis of heat units used instead of the volume of gas consumed were filed with the Public Service Commission recently by the Northern Indiana Public Service Company.

Specifically, the Northern Indiana Public Service Company asks permission to issue its bills expressing charges for gas used on the basis of "therms" or heat units, rather than in cubic feet as at present. The proposed schedule is similar to the one recently placed in effect in Chicago by The Peoples Gas Light and Coke Company, with the approval of the Illinois Commerce Commission.

The therm basis of billing, it was explained by Morse DellPlain, President of the company, contemplates no change in the cost of gas service to the customer. Furthermore, he pointed out, if the therm basis is approved, the present cubic foot rates will be continued in effect as optional.

"An important reason for the proposed change in the system of billing," Mr. DellPlain said, "is the fact that arrangements have been completed for purchase of petroleum refinery gas in the vicinity of the cities affected. This gas, like natural gas, has a much higher heating value per cubic foot than the gas with which customers are now being supplied.

"It is planned to mix the petroleum refinery gas with the coke oven gas now being supplied, thus increasing substantially the heating value of the gas distributed to customers. Under the therm basis of billing, the customer will pay only for the quantity of heat used, regardless of the volume of gas in which the heating value is contained."

First Plant of the Georgia Natural Gas Corp. Completed

Completion of the first plant of the Georgia Natural Gas Corporation in Georgia has recently been celebrated by the mayor and city council, of Carrollton, Ga., assisted by members of the Civitan Club.

In the presence of a large gathering of citizens from all sections of Carroll County, Mayor Luck, of Carrollton, formally inaugurated the new distribution system for the city. Following this, a reception was tendered J. H. White, president of the Southern Natural Gas Corporation, and Reuben R. Arnold, of Atlanta, chief counsel for the company, by the Civitan Club.

Plants of a smaller size will be constructed in a number of other Georgia cities and towns during the summer, it has been announced.

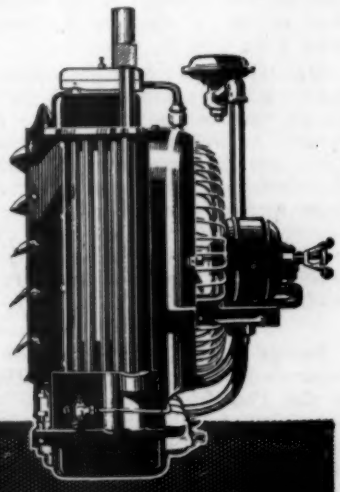
Protecting 5,000 Plates against Costly Corrosion

AT THE Reynolds & Reynolds printing plant, Dayton, Ohio, the problem of keeping 5,000 expensive zinc plates free from corrosion due to dampness while in the storage room, was effectively solved with Humphrey Gas Unit Heaters. Heated air is circulated between the hanging plates reducing the relative humidity of the atmosphere to a point where corrosion and consequent loss are safely avoided.

While this is only one of the many special applications of Humphrey Gas Unit Heaters, hundreds of factories and varied industries depend upon these modern gas fired heaters as their sole heating equipment. They burn gas, the ideal fuel, in the most efficient manner and the circulation of air set up by a Humphrey Gas Unit Heater gives a greater heating efficiency than other methods. They are thermostatically controlled and no operating attention is necessary.

Why not get all the facts regarding these profitable heaters?

Interesting catalog sent on request.



GENERAL GAS LIGHT COMPANY, KALAMAZOO, MICHIGAN

New York • • Pittsburgh • • Cleveland • • San Francisco

The Humphrey *Gas* UNIT HEATER

PERSONALS

J. Gardner Menut has been appointed Manager of the Capital Division of New York Power and Light Corporation. Mr. Menut, who was formerly assistant to Mr. J. I. Haley, Vice President, assumed his new duties on November 1st. As manager of this division, Mr. Menut will supervise the operating activities, both gas and electric, throughout the Capital Division. The resident managers of the several districts comprising this division will report directly to Mr. Menut, whose headquarters will be at 126 State Street, Albany.

Born in St. Johnsbury Center, Vermont, Mr. Menut began work at an early age as telegraph messenger boy. His public utility career started soon after by trimming arc lamps for the St. Johnsbury Electric Company in Vermont. From this beginning, he has since continued with companies supplying electric, gas, street railway, steam heat, water or telephone service, holding various managerial and executive positions. During his wide and varied career, Mr. Menut has filled important positions in public utilities in New Hampshire, Vermont, New York, New Jersey, Pennsylvania, Maryland, South Carolina, and Florida.

More recently, Mr. Menut held managerial positions with the General Gas and Electric Company in several eastern states, and just previous to his association with the New York Power and Light Corporation, more than a year ago, he was assistant to the vice president of W. S. Barstow & Company, New York City.

Mr. Menut has been responsible for the design and construction of the Company's new Service Building at North Albany, as well as service buildings at Troy and Gloversville. In laying out these buildings, Mr. Menut's efforts have been directed toward expediting and improving service to gas and electric customers, and the buildings contain the most modern and efficient equipment available.

George Mauger, formerly Chief Sales Supervisor of Automatic Water Heaters of the Philadelphia Gas Works Company, Philadelphia, Pa., has been promoted to Chief Sales Supervisor of all appliances.

C. R. Logan was recently appointed Chief Supervisor, Refrigerator Sales Division of the Philadelphia Gas Works Company, Philadelphia, Pa.

L. W. Emery has recently joined the Accounting Staff of Columbia System at New York.

Mr. Emery comes to Columbia System with broad experience in the public utility accounting field, having been Treasurer of several utility properties of one of the larger management systems in this country.

M. T. Scott recently resigned his position of Sales Superintendent of the Consumers Power Co., Pontiac, Mich., to make a new connection in the same capacity with the Central Indiana Gas Company, Muncie, Ind.

A. C. Moorhaus Purchasing Agent of the Union Gas & Electric Company, Cincinnati, Ohio, since 1924, has been made Acting General Manager of the company, it has been announced by Mr. H. C. Blackwell, President.

Mr. Moorhaus, became affiliated with The Union Gas & Electric Company six years ago, after resigning as secretary of the Scioto Valley Railway and Power Company, Columbus.

W. R. Freeman has been appointed Acting Purchasing Agent of the Union Gas & Electric Company, Cincinnati, Ohio, succeeding Mr. A. C. Moorhaus who was appointed Acting General Manager of the Company.

W. N. Grinstead was recently appointed Assistant Treasurer of the Binghamton, N. Y., group of the Columbia Gas & Electric Company. He was formerly located in Columbus, Ohio.

Sheridan Black has been transferred from the Columbus Group of the Columbia Gas & Electric Company to Binghamton, N. Y., in the capacity of Distribution Engineer.

Howard Pett has been appointed District Manager of the Consumers Power Company at Lansing, Mich., succeeding Clark R. Graves, who resigned. Mr. Pett was formerly district manager at Jackson, Mich.

Mr. Pett started with the organization twenty-four years ago in Big Rapids as local manager for the Grand Rapids-Muskegon Power Company.

Floyd D. Avis has succeeded Howard Pett as manager of the Jackson, Mich., District of the Consumers Power Co. Mr. Avis was assistant general manager of the Southern Michigan Light and Power Co., when that property was taken over by the Consumers Power Company in 1926.

W. G. Peterson formerly Director of Personnel, of the Westchester Lighting Co., was promoted to the position of assistant treasurer and commercial manager of Bronx, N. Y., Gas and Electric Company.

A. Mould has become merchandising manager for the three allied utilities, the Rushville Gas Company, the Central Fuel Company and the Eastern Indiana Gas Company at Rushville, Ind. He was formerly president manager for the Northern Indiana Fuel and Light Company at Auburn, Ind., and was identified with the Insull interests in Niles, Mich.

V. L. Board, who has been general superintendent of the Public Service Company of Colorado for about twelve years has been elected a vice president of the company.

Mr. Board, who is a graduate of the University of Missouri. came to the Doherty interest in 1910 as an apprentice engineer and two years later was assigned to the New York office, in charge of various engineering projects. Returning to Denver in 1917 as a special engineer he was made general superintendent shortly thereafter.

Morton H. Bogie has rejoined H. M. Byllesby & Company in charge of sales in Illinois. Mr. Bogie resigned about a year ago to become manager of country sales of Stone and Webster and Blodgett, Inc. He left the latter organization about the first of the year to join Hill, Joiner and Company as special city representative, in which capacity he remained until returning to H. M. Byllesby and Company.

Eugene H. Rosenquest, Jr., has been promoted to the position of manager of the Trades Relation Division of the Westchester Lighting Co., Mount Vernon, N. Y. Mr. Rosenquest entered the employ of the company on August 1, 1928, assuming the duties of representative of the Division. In March, 1929, he was made supervisor of the Division, a position he still holds.

Mr. Rosenquest recently completed a course in public utilities management conducted at the School of Business Administration of Harvard University.

Clate Bragg, who for the past five years has been associated with the Wichita Gas Company, has taken charge of the New Business Engineering Department, filling the vacancy created by the resignation of A. C. Kuehnert.

William J. Hagenah, vice president and special counsel, Byllesby Engineering and Management Corporation, Chicago, has been elected a director of the following companies: Northern States Power Company (Delaware), Northern States Power Company (Minnesota), Northern States Power Company (Wisconsin), Louisville Gas and Electric Company (Delaware), Louisville Gas and Electric Company (Kentucky), and Louisville Hydro-Electric Company (Delaware).

Harold Diggle, formerly of the New Business Department of the Kansas City Gas Company, now is located at the Union Public Service Co., at Merriam, Kans., as New Business representative of that property.

George C. McLaughlin, formerly chief inspector in the Hammond district of the Northern Indiana Public Service Company, has been appointed superintendent of the Michigan City, Indiana, district. He succeeds James M. Crouch, who has been assigned to special duties at the new Michigan City generating station.

ROBERTS
CONTROLLED
GAS HEATING UNIT

THIS TRADE MARK IS YOUR GUARANTEE
OF A LIFETIME OF EFFICIENT
HEATING SERVICE

From the Radiants to the Manifold

Roberts is constructed to give a lifetime of efficient heating service

FROM the radiants to the manifold, the Roberts Controlled Gas Heating Unit is constructed to give a lifetime of efficient heating service. The Roberts was designed by a man who was brought up in the gas industry. And the Roberts Gordon Appliance Corporation is composed of former gas utility men who understand the necessity for building a product requiring a minimum of service.

For instance—the Roberts china radiants are compounded of a secret formula, used exclusively by the Roberts Gordon Appliance Corporation, which makes them so sturdy that frequent replacement is unnecessary.

The air duct of the Roberts Burner is constructed of highest quality Armco iron. The drawn steel Venturi Mixers are so smoothly finished that they permit 30% higher air injection. The 1¼" manifold assures an abundant supply of gas to the burner. The sturdy air cooled castings are built to endure. The Roberts patented safety pilot insures safe operation of the burner at all times. In short—Roberts has designed and perfected a superior gas burner—your guarantee of complete customer satisfaction.

Learn the full story of this great burner. It is interestingly told in the Roberts book, "Sell Health and Comfort." A copy will be gladly sent without obligation.

LISTED AS STANDARD BY UNDERWRITERS LABORATORIES

ROBERTS-GORDON APPLIANCE CORPORATION

DELAWARE AVENUE AT TUPPER STREET

CURTISS BUILDING BUFFALO, N. Y.

TRADE MARK

TRADE NEWS

United Engineers and Constructors, Inc.—Activities

Contract has been awarded by Rosslyn Gas Company, Rosslyn, Virginia, to furnish, deliver and install 3500 feet of 6" welded steel main in Arlington County, Virginia.

Contract has been awarded by Alexandria Gas Company, Alexandria, Va., to furnish, deliver and install 17,200 feet of 6" welded steel main in Alexandria County, Virginia.

Contract has been awarded by Wilmington Gas Company, Wilmington, Delaware, to furnish, deliver and install 38,100 feet of 12" and 4750 feet of 8" welded steel main from the Penna.-Delaware State line to Wilmington, Delaware.

Contract has been awarded by Mobile Gas Company, Mobile, Alabama, to furnish miscellaneous material and install distribution systems in the towns of Chickasaw, Shadowlawn, Whistler, Toulminville and Prichard, Alabama.

Contract has been awarded by Florida Public Utility Company, Pensacola, Fla., to construct 48,350 feet of 16", 12", 10", 8" and 6" main in Pensacola, Florida.

Contract has been awarded by Virginia Public Service Company of Newport News, Va., to furnish, deliver and install one (1) 8'6" cone top generator, complete for the above named place.

Contract has been awarded by Wisconsin Power & Light Company, Fond du Lac, Wis., to furnish one hot coke car, for their plant at Fond du Lac, Wisconsin.

Contract has been awarded by The Rockville-Willimantic Lighting Company, Willimantic, Conn., to furnish, deliver and install one 5' generator for the plant at Willimantic, Conn.

Kloenne Victorious in Patent Litigation

The Stacey Brothers Gas Construction Company, division of Stacey Engineering Company, Cincinnati, Ohio, United States representative for the Kloenne Waterless Holder, issued a statement advising that,

"The Kloenne Holder is held to be no infringement of the Man Patent. The provincial court of Dortmund at the hearing on October 23, 1930, rejected the suit of Maschinenfabrik Augsburg-Nurnberg at Nurnberg, against the firm of Aug. Kloenne at Dortmund in connection with waterless gas holders.

"The Court of Dortmund stated that the firm of Aug. Kloenne does not infringe the Man patent, with his waterless gas holder. The court in this judgment has joined the opinions of two experts appointed by the court, Geheimrat Laskus and Geheimrat Pels-Leusden both answering in the negative the question of patent infringment."

The Stacey Bros. Gas Construction Company, a division of The Stacey Engineering Company, located at Cincinnati, Ohio, is the United States representative for the Kloenne Waterless Holder and erects these holders under the name of the Stacey-Kloenne Holder.

W. S. Stewart Appointed Cleveland District Manager of the Lincoln Electric Co.

The Lincoln Electric Company, Cleveland, Ohio, announce the appointment of W. S. Stewart, formerly in charge of the Pacific Coast offices of that Company, to District Manager in charge of the Cleveland territory with offices at the Factory, Coit Road and Kirby Avenue.

Mr. Stewart is a graduate of Yale University. After graduation he spent a number of years in the factory of The Lincoln Electric Company studying arc welding in all its phases. He was then transferred to the automatic arc welding department where he spent several years demonstrating and applying The Electronic Tornado process of welding. After this he was transferred to the Sales Department and sent to the Pacific Coast. His wide practical experience thoroughly qualifies him for his present position.

Pittsburgh Equitable Meter Company Opens Iowa Territory

In the face of general business retrenchment, the Pittsburgh Equitable Meter Company continues to intensify its sales efforts in the North West by creating an additional sales division in Iowa with headquarters at Davenport.

Mr. A. L. Fritchey, who has enjoyed a long, successful career as national representative of the Pittsburgh Equitable Meter Company handling its entire line of gas meters, water meters and pressure regulating equipment, has been promoted to be District Manager of this territory.

Harbison-Walker Offer Film on Manufacture of Refractories

The Harbison-Walker Refractories Company, Pittsburgh, Pennsylvania, have just completed a 5000-foot motion picture illustrating modern methods employed in the manufacture of refractories. The film shows every step in the production of refractories from the mining of raw materials to the loading and shipping of the finished product. Scenes in the research and control laboratories and some interesting animated photography showing the action of periodic and continuous tunnel kilns are also included in the picture.

This Harbison-Walker film is available, without cost, to technical societies, engineering organizations, industrial organizations, universities, colleges, technical schools and research laboratories. It is suggested that early applications be made to Harbison-Walker Refractories Company, 1800 Farmers Bank Building, Pittsburgh, Pa.

New Appointments by Foxboro

Mr. A. H. Shafer has been recently appointed Manager of The Foxboro Company's Pittsburgh Office, replacing Mr. H. S. Gray, who is now in charge of office routine at the home plant.

New Fluid Meter Bulletin

"Mechanically Operated Fluid Meters" is the title of a new bulletin now being distributed by the Bailey Meter Company of Cleveland, Ohio.

This bulletin which is designated as No. 37 describes and illustrates various types of mechanically operated Meters and auxiliary equipment for their instllation. Colored meter chart records showing results obtained by the application ot Bailey Meters to various processes are included, together with sections on orifice and flow nozzle location, calibration, pulsating flow, special conditions and special applications.

This 52-page bulletin also includes a long list of users of mechanically operated Fluid Meters showing installation data for various services and fluids.

Two New Pittsburgh Equitable Meter Catalogs

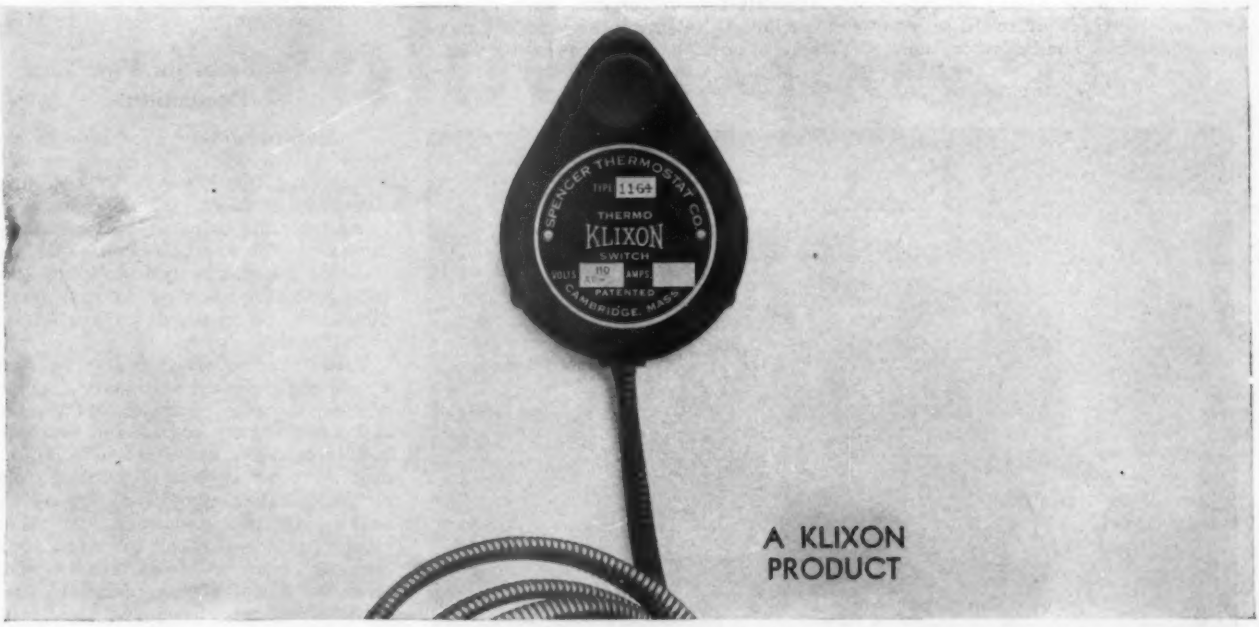
The Pittsburgh Equitable Meter Company has just issued two new catalogs giving complete information about Emco Balanced Valve Regulators and the new Emcorector. Anyone in the Gas Industry desiring a copy of either or both of them, need only direct his request to the Pittsburgh Equitable Meter Company, 400 North Lexington Ave., Pittsburgh, Pa.

Cutler-Hammer Move to New Quarters in Philadelphia

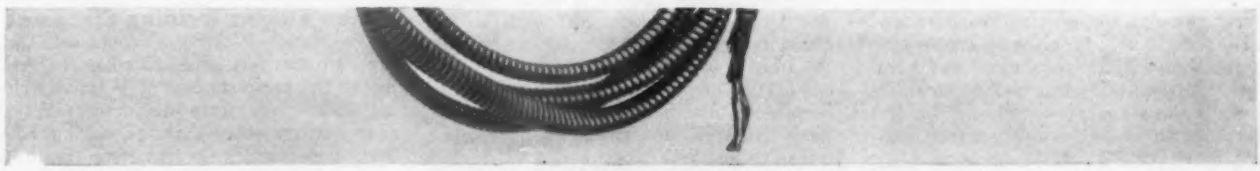
The Philadelphia Sales Office of Cutler-Hammer, Inc., is now located in the new Terminal Commerce Building, 401 North Broad Street, Philadelphia, Pa.

(Trade News Continued on Page 88)

NEW THERMO-OPERATED ELECTRIC SAFETY SWITCH for PILOT-CONTROLLED BURNERS

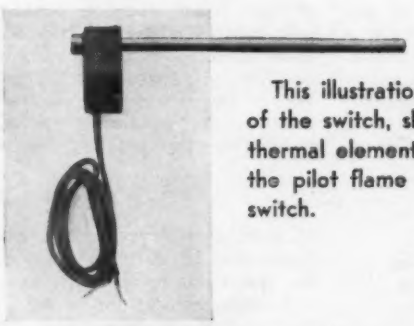


THE new KLIXON Thermo-Electric Switch is a simple, rugged, reliable, and most efficient safety device to guard against the dangers of pilot outage on all kinds of automatic burners. This KLIXON switch employs the famous Spencer snap-acting disc. It is a universal switch, so made that the thermal element can be set adjacent to (at the side of, or over) the constantly burning gas pilot flame, to guard against gas escaping at the burner in case the pilot goes out. It is used (connected in series) with the electric controls, such as the room thermostat, the main gas cut-off, the solenoid valves, etc.



The switch is adjustable for use with temperatures on the thermal tube ranging from 0° F. to 900° F. A temperature difference of 40° F. operates the switch.

We will gladly send complete technical data to anyone interested.



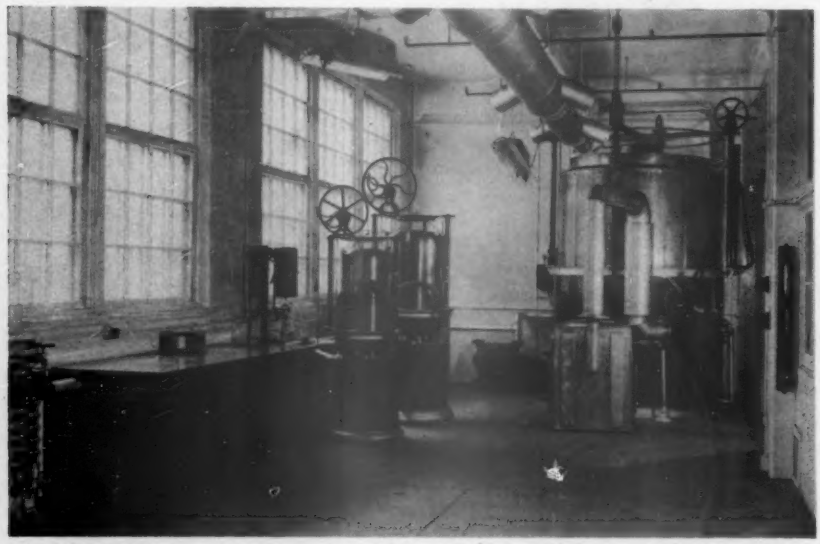
This illustration is the side view of the switch, showing the Monel thermal element which extends to the pilot flame and operates the switch.

SPENCER THERMOSTAT CO

CAMBRIDGE · · · MASS

American Meter Company Further Expands Research Facilities

Additions to the floor space, equipment and personnel of the Albany laboratory of American Meter Company have recently been completed. The laboratory now occupies an area of 950 square feet. It specializes in experimental and testing work relative to low pressure measurement. Activities are coordinated with the Company's research laboratory at Metric Metal Works, Erie, Pa.



Portion of American Meter Company's Albany Laboratory

To maintain a uniform room temperature essential for proving tests, the Albany laboratory is equipped with an automatic temperature regulation and ventilation system. By this means stratification of the air is prevented and the temperature maintained within narrow limits.

The air supply for the provers is furnished by a low pressure blower, which draws the air from the vicinity of the provers and admits it to the provers at a pressure only slightly above atmospheric.

A light non-volatile mineral seal oil is used in the provers as a sealing medium. This oil, due to its low specific heat, readily follows gradual changes in room temperature. Its specific heat is not low enough, however, to permit it to follow rapidly the sudden rise in room temperature which occurs in the early mornings during the winter months when the drop in temperature during the night is brought back to normal. In order to bring the oil temperature up to that of the room, under such conditions, the oil is circulated through an electric heater, being pumped out of the prover, circulated around the heating coils and back into the prover.

To facilitate the conducting of proving tests with both large and small meters, the laboratory is equipped with a five cubic foot, a ten cubic foot and a one hundred cubic foot prover.

The size of the laboratory is such as to permit the installation of additional equipment and apparatus as needed.

The testing and experimental work conducted in the Albany laboratory endeavors to add wherever possible to modern meter design and construction. It seeks also to establish additional facts that relate in particular to the behavior and to the commercial efficiency of the meter under conditions encountered in present day Gas Industry practice.

Bryant Heater & Mfg. Co. Awarded Bronze Plaque for Best No-Accident Record

The Bryant Heater & Mfg. Company, Cleveland, Ohio, recently was presented the first prize bronze plaque for the best no-accident record in the Heavy Machine Shop Division, Group B, in a contest conducted by the National Safety Council.

The award was presented on the occasion of the 19th Annual Safety Congress recently held in Pittsburgh.

The contest, promoted in the interest of greater employee safety in industrial plants, was based on the least number of lost hours due to accidents to employees.

A single accident during the six months the contest ran, prevented the Bryant Company from having a perfect slate—yet this resulted in a loss of only 8 of the more than 150,000 employee-hours.

Considerable distinction is attached to this extraordinary accomplishment, because of the national scope of the contest and the number of industrial plants taking part.

J. N. Schweikert, Director of Manufacturing attributes the enviable record to a constant campaign of safety education among the factory employees in conjunction with the commendable efforts of the National Safety Council.

New Bulletin on Pipe Line Protection

"Safeguarding your Pipe Line Investment" is the title of a bulletin recently issued by Johns-Manville, 292 Madison Avenue, New York. This booklet treats in part on the value of protection and causes of pipe line corrosion. The outstanding features of J-M Asbestos Pipe Line Felt are described, as well as the three principal methods of application, as follows:

Yard wrapping, which is done by using a specially designed stationary machine wherein the pipe is fed to the machine and automatically coated and wrapped, is fully described and illustrated. This is done at some central distributing point on the operating company's property and is used by gas companies and others owning systems that call for much small-diameter pipe or comparatively short stretches of pipe of larger diameter.

Mill-wrapping, developed by Hill-Hubbell & Company, for furnishing a means of wrapping at the pipe mill, sizes from ½ inch to 26 inches, is also described and illustrated.

A chapter is devoted to field wrapping with the Johns-Manville-W-K-M traveling type hand operated pipe wrapping machine. This is illustrated by photographs of the machine in operation.

New Fusion Welding Circular

The Fusion Welding Corporation, Chicago, Ill., has just issued Circular No. A-43 listing the complete line of Weldite welding rod. Over forty distinctly different rods to cover every phase of welding have been conveniently grouped to facilitate the user in selecting the best rod for his particular application. General information such as standard rod sizes and lengths, packing and other details are also included.

Selection of any particular rod has been made easy by listing the rods first by the type of application as mild steel, cast iron, etc., second by the process employed as metallic arc, carbon arc or gas and finally by the surface finish of the rod itself as bare, surfaced and fluxed.

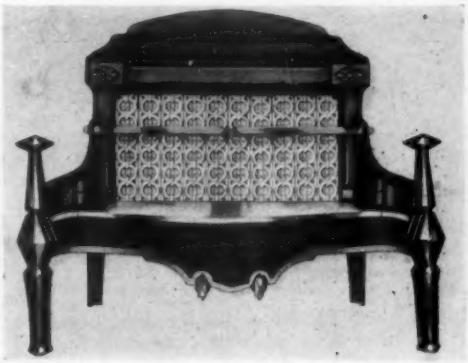
New Arc Welding Accessory Catalog

The Fusion Welding Corporation, Chicago, Ill., recently issued a catalog illustrating and describing their complete line of electric arc welding accessories and supplies. Net prices are also included. The size of the catalog is convenient for filing.

Copies may be had by addressing the Fusion Welding Corporation.

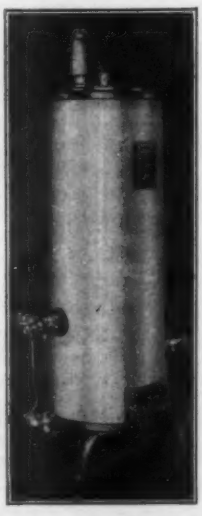
(Trade News Continued on Page 90)

Time proved value is of Key Importance in these days of Careful Buying



THESE are days of careful buying. Close scrutiny of value is the rule . . . And the name Welsbach, backed by 40 years of earned leadership in the gas appliance field, is recognized by Commercial Managers more fully than ever before as a definite factor in making sales... **Welsbach Radiant Heaters** are outstanding because of their original design and fine finish—yet are moderately priced . . . Welsbach quality is revealed in every detail of their construction.

Welsbach Water Heaters have gained their leadership through their efficient performance (and favorable prices). In fact there is not a single detail of any Welsbach appliance that will not bear close examination by today's buyers. When Welsbach gas appliances are featured, profitable sales are sure to result.



Member of American Gas Association

WELSBACH COMPANY

GLOUCESTER CITY, N. J.

Offices in Principal Cities

Model Meters—A Plant Advertising Feature

A novel advertising installation has been installed on plants of the Pittsburgh Equitable Meter Company, featuring illuminated models of their product. Attention is directed to the roof feature from adjacent points by floodlighting the building front which attracts attention to the roof sign and illuminated models.

The Susquehanna Street plant is illustrated showing a 190 ft. long by 12 ft. illuminated sign and a scale model of a meter built around the plant water tank.

A somewhat similar installation is provided on the Lexington Avenue plant having two different models of their gas meters on extreme ends of the building and an illuminated sign in the intervening area.

Design Competition

Considerable has been said and written recently regarding the appearance of commercial and industrial structures in general. The elevated tank, often being of considerable height and located where not screened or hidden by trees or adornments, has come in for its share of discussion.

The desire for more aesthetic commercial structures is by no means going unheeded. Architects, engineers, and manufacturers themselves, are giving major consideration to appearance. An example of effort along this line is competition for improved design in elevated steel tanks, which is being sponsored by the Chicago Bridge & Iron Works, Chicago, Ill.

Four thousand dollars in prizes are being offered for the best eight renderings, divided as follows:

First Prize	$2,000.00
Second Prize	1,000.00
Third Prize	500.00
And 5 Honorable Mention Prizes of, each	100.00

Entries in the competition will consist of two drawings of a typical elevated steel tank with a nominal capacity of 200,000 gallons, a height to top of approximately 110 feet, a height to bottom of not less than 85 feet, and a riser not less than five feet in diameter.

One drawing will include a direct elevation and two horizontal sections or plans, ¼" scale. The other will be a perspective drawing to the same scale.

The entries will be received anonymously, displayed in a suitable room in an impartial manner and judged by a Jury of Award consisting of Mr. Howard Cheney, President of the Chicago Chapter of the A. I. A., Mr. R. W. Zimmerman, Architect, of Chicago, and Mr. George T. Horton, President of the Chicago Bridge & Iron Works.

Mr. Albert M. Saxe of 430 North Michigan Avenue, Chicago, Illinois, has been appointed Professional Advisor for the competition and will handle all communications regarding it. A brochure giving complete details of the competition may be secured by addressing Mr. Saxe.

Is Your Gas Bill Too Low?

The above is the title of a booklet issued by the Humphrey Co., Kalamazoo, Mich. It answers the question as follows:

"Correctly understood, every household should ardently desire larger instead of smaller gas bills. The small bill indicates limited benefits, the larger bill, larger benefits in proportion.

"Commonly, the gas bill is considered new and additional expense, whereas it is merely an old expense modernized. You have a constant need for heat for cooking, dishwashing, bathing, shaving, laundering, cleaning, and the scores of other daily household tasks. No matter what fuel you may use, it costs you something in money, to say nothing of time, effort, waiting, and general inconvenience. With gas, all the bother is done away with, and the old expense, done away with also, pays for the modern fuel, gas.

"For instance, the cost of gas for cooking is no more than the cost of the fuel you formerly used. The cost of operating a gas refrigerator is more than paid for by the elimination of the ice bill. And so it is with the Humphrey Kalamazoo Automatic Water Heater. You have a constant demand for hot water. No matter how you heat it now, it costs you something. Even if it does increase your gas bill slightly, the increase is met with a saving somewhere else.

"Gas is the most flexible of all fuels. It is always there, ready for use. Turn it on—use what you want—shut it off. It is like a perfect servant, eager to help you to greater convenience, greater comfort, even greater economy.

"The more tools, or gas appliances you give it to work with, the more it can serve you, and the more it can save you.

"So you see, a larger gas bill doesn't indicate larger expense. It means greater benefits through the modernization of an expense you already have."

Surface Combustion Acquires New Properties

In line with the expansion policy of the Surface Combustion Company of Toledo, Ohio, with respect to their greater service to the gas industry, Mr. Frank H. Adams, General Manager, has just announced the acquisition of the Gas Equipment Division, including Foundry of the Columbus Heating & Ventilating Company of Columbus, Ohio, manufacturers of gas fired warm air furnaces and unit heaters.

The Surface Combustion Company originally specialized in gas fired designed industrial equipment and have been very active in the automotive, steel and other industries.

In the last three years, they have carried on an extensive research and development program with respect to gas conversion burners for installation in boilers and warm air furnaces. During the last two years they have also carried on an aggressive merchandising campaign with respect to the Janitrol, which is the trade name of their gas conversion burner, and at the present time have over 30,000 of these in operation throughout the country, both in natural gas and manufactured gas territories.

The acquisition of the Columbus Heating & Ventilating Company will add to their domestic heating line, a high grade of gas fired warm air furnaces and unit heaters which will in turn permit them to increase their services along these lines to the gas industry.

For the present, the manufacturing activities will be maintained in Columbus, but all of the sales activities will be consolidated with the selling organization of the Surface Combustion Company which consists of some sixty members and eleven district offices.

It is also anticipated that the present line of Columbus gas fired designed furnaces will be augmented both from the standpoint of style, sizes and price range in order to make the service to the gas industry as broad as possible.

Recently, the Surface Combustion Company, Inc., also acquired the Chapman-Stein Company of Mt. Vernon, Ohio, in order to round out their services in the way of equipment to the steel industry. This was taken over about a year ago, and then the Webster Engineering Company of Tulsa, Okla., was taken over about two years ago.

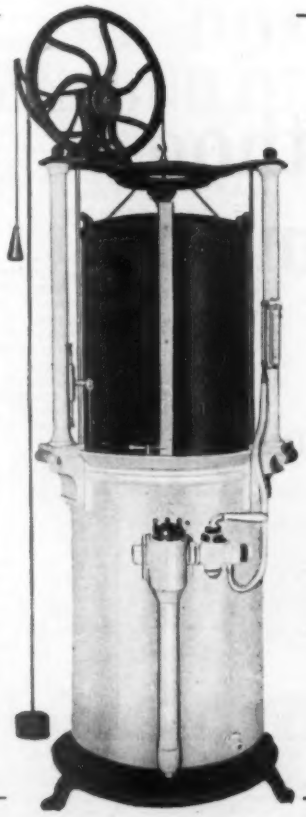
Bristol Company Issues New Catalog

Catalog No. 2002, recently issued by the Bristol Company, Waterbury, Conn., features Bristol's Automatic Controller Valves Motor Operated Types. Latest developments in Type BK for steam, water, air and gas are described and illustrated on pages 9, 10 and 11 of this book.

Copy of this catalog may be had upon request.

SUPERIOR

Gas Meters
Provers
Service Cleaners
Diaphragms
Repairs



SUPERIOR METER CO.
167-41st Street
Brooklyn, N. Y.

PARTLOW
TEMPERATURE CONTROLS

PARTLOW
AUTOMATIC GAS BURNING EQUIPMENT
Saves Labor . . Minimizes Waste
Eliminates Danger of Cracked Pots
Is Easily Applied . . Speedy in Melting . . Low in Price

Soft Metal Furnace

. . . When the desired temperature is reached with a Partlow equipped Soft Metal Furnace—the gas and air is automatically cut off and the motor stops. Thus saving wear and tear on motor. . . electric current. . . and gas consumption. Overheated metal is eliminated and uniform plates or slugs assured.

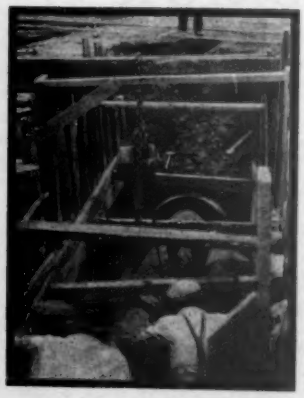
Catalog and prices on request.

The PARTLOW CORPORATION
NEW HARTFORD, N. Y.

PARTLOW
SAFETY GAS VALVE *and* PILOT

This Modern Method *of* Pipe Placement *saves*

MONEY
TIME
TRAFFIC DELAYS
INSPECTIONS
REPAIRS
FUTURE TROUBLE



An opening for gas mains to be run through Armco Corrugated Iron Pipe installed by the Armco Jacking Method: At Buffalo, N. Y.

FOR every economic reason, engineers now specify and use the modern Armco Jacking Method—the Armco development of a simplified way of obtaining openings for conduits and mains through existing fills and under railroad tracks and highways. They realize the advantage of this improvement as a time and money saver, and its value in avoiding detours and traffic delays.

The Armco Jacking Method works entirely under the ground. It cannot disturb the surface or foundation, nor cause future sagging of the pavement. Using a small crew of unskilled labor and consuming little time, its cost is often as low as one half that of older methods.

Armco Corrugated Iron Pipe, being so durable, adds to economy by serving many years without inspection or repairs. Its unequalled record of 24 years continuous service to date is assurance against future trouble. Data and instructions on the Armco Jacking Method are in the booklet, "Reducing the Cost of Culvert Placement." Write for your copy.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand

ARMCO CULVERT MANUFACTURERS ASSOCIATION
Middletown, Ohio.

C. 1930, A.C.M.A.

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Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 106.

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The Western Gas Construction Co. 88
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Western Gas Construction Co. 451
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American Meter Co. 320
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The Koppers Construction Co. 235
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Andale Co 47
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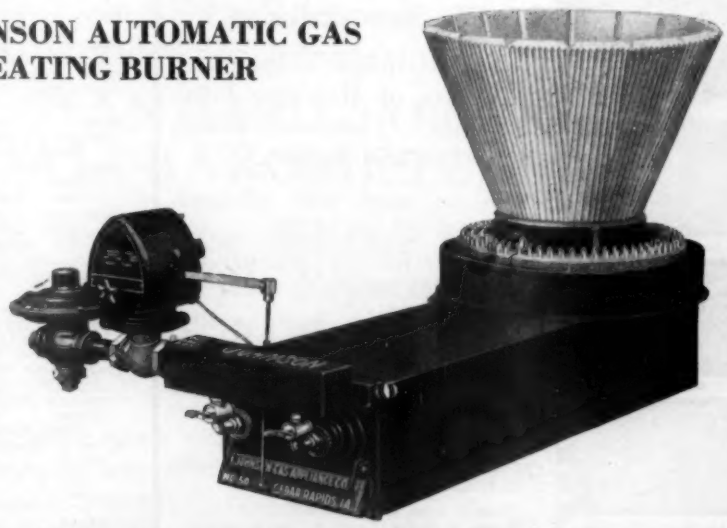
OPENING THE DOOR TO A GREAT LOAD-BUILDING FIELD—

THE JOHNSON AUTOMATIC GAS HEATING BURNER

The possibilities of gas home heating as a load builder are materially increased by this unusual burner. The demands of the public for maximum safety, efficiency, and dependability are more than gratified by this carefully designed burner. We are anxious to tell you the whole story—please write.



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Cedar Rapids JOHNSON PATENTED DIRECT JET **IOWA**

C-F is "EVERY PURPOSE Regulation"

This installation of a Chaplin-Fulton Low Pressure Regulator represents modern practice in safety regulation of natural gas—everywhere.

C-F Regulators of more than forty types are widely used where safety is considered quite important, and dependable operation is demanded.

Extra sensitive in response to the variations in flow, they are strong, well designed and have all the characteristics that superior workmanship has been able to create during the experience of the oldest gas regulator manufacturing organization.

Every type of C-F gas regulator is fully illustrated and described in our Catalogue and Bulletins. Present your service problem and we'll send you the correct **Regulation** *solution.*

The Chaplin-Fulton Mfg. Co.
28-40 Penn Ave. Pittsburgh, Pa.

HYTEMPITE

is the universally used high temperature cement for Gas Plants, because it

—insures quick, economical repairs of Retorts, Jamb Joints, Furnace Walls, Arches and Baffles.

—can be used with salvaged, crushed old fire brick.

—not affected by heating and cooling of ovens.

—stands up under severe weather conditions.

—makes thin, strong joint between tile or brick that stands up under extreme abrasive action of clinker tools.

—easily shot into place with Quigley Refractory Gun.

Keep a drum of HYTEMPITE in Report House or Boiler Room for quick repairs.

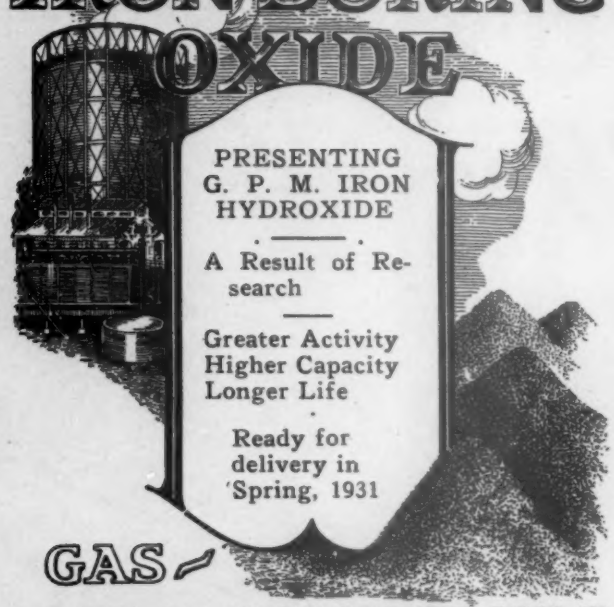
QUIGLEY COMPANY INC.

INDUSTRIAL SPECIALTIES

56 West 45th Street, New York

Distributors with Stock and Service in every Industrial Center

IRON BORING OXIDE



PRESENTING G. P. M. IRON HYDROXIDE

A Result of Research

Greater Activity
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Ready for delivery in Spring, 1931

GAS PURIFYING MATERIALS COMPANY INC.

FOOT OF HALSEY STREET LONG ISLAND CITY
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BRANCH YARD—PROVIDENCE, R. I.

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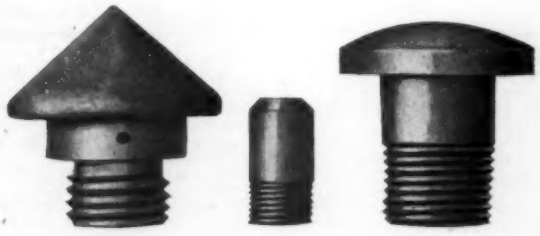

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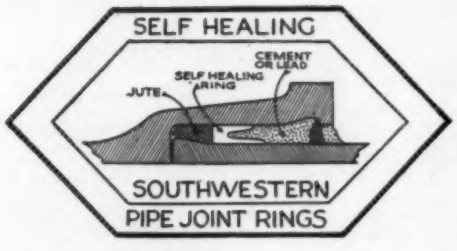

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GAS TESTING APPARATUS
American Meter Co.
Metric Metal Works.

GATE VALVES (See Valves)

GATES—WIND & BLAST
The P. H. & F. M. Roots Company.
The Western Gas Construction Co.

GAUGE BOARDS
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
United Engineers & Constructors, Inc.
The Western Gas Construction Company.

GAUGES
American Meter Co.
The Bristol Company.
Brown Instrument Co., The
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
The P. H. & F. M. Roots Company.
Superior Meter Co.
Taylor Instrument Companies
The Western Gas Construction Company.
Mercury
Precision Thermometer & Instrument Company.
Pressure-Recording
American Meter Co.
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Siphon
Precision Thermometer & Instrument Company.
Tank
Brown Instrument Co.
Precision Thermometer & Instrument Company.
Water
Precision Thermometer & Instrument Company.

ACETYLENE, WELDING
Oxweld Acetylene Co.

GLOVES
Rubber
Safety Gas Main Stopper Co.

GOVERNORS
Pittsburgh Equitable Meter Co.
Automatic
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.

GOVERNORS (Calorimeter and Double Dry)
American Meter Co.
Reynolds Gas Regulator Co.
Coke Oven
The Chaplin Fulton Mfg. Co.
Connelly Iron Sponge & Governor Co.
The Gas Machinery Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
District
The Chaplin Fulton Mfg. Co.
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Isbell-Porter Co.
The P. H. & F. M. Roots Company.
Smoot Engineering Corp.
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Groble Gas Regulator Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
The Sprague Meter Co.
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Lambert Meter Co.
D. McDonald & Co.
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Low Pressure
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Groble Gas Regulator Co.
Lambert Meter Co.
Reynolds Gas Regulator Co.
Smoot Engineering Corp.
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Retort House
Isbell-Porter Company.
Station

GRATES for Water Gas Generators
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The Western Gas Construction Co.

GRAVITOMETERS
Precision Thermometer & Instrument Company.

GRIDS, for Scrubbers
Semet-Solvay Engineering Corp.
The Western Gas Construction Co.

GUN-REFRACTORY
Quigley Co., Inc.

HEATERS
Feed Water
Andale Company.
For Oil
Andale Co.
American Gas Products Corp.
American Stove Company.
Homestead Heater Company.
Kompak Company
Roberts-Gordon Appliance Corpn.
Welsbach Company.

HIGH CAPACITY METERS
Lambert Meter Co.

HOISTS
The Gas Machinery Co.
C. W. Hunt Co., Inc.
The Western Gas Construction Co.

HOLDERS
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Cruse-Kemper Co.
Gas Engineering Co.
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Stacey Bros. Gas Const. Co.
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The Western Gas Construction Co.

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The Stacey Mfg. Co.
The Western Gas Construction Co.

HIGH PRESSURE STORAGE
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Stacey Mfg. Co.

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Cruse Kemper Co.
Gas Engineering Co.
Improved Equipment-Russell Engineering Corp.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
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American Meter Co.

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The Brown Instrument Co.
Precision Thermometer & Instrument Company.
Taylor Instrument Companies

INCINERATORS, GAS-FIRED
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Surface Construction Co.

INDUSTRIAL GAS MIXERS
Roberts-Gordon Appliance Co.
Smoot Engineering Corp.

INDUSTRIAL TRACK
C. W. Hunt Co., Inc.

IRON BORING OXIDE
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IRON SPONGE
Alpha Lux Co.
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American Meter Co.
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Brown Instrument Co., The
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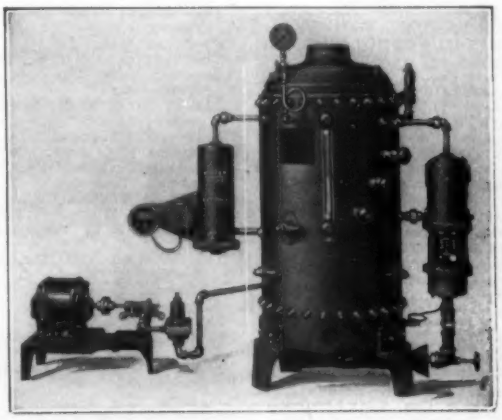

All Pressures
½ to 30 Horsepower

P. M. LATTNER MFG. CO.
Cedar Rapids, Iowa

GROBLE REGULATORS & GOVERNORS

Complete line of Regulators for

NATURAL
MANUFACTURED
BUTANE
PROPANE
GASES

HANDY INDICATOR for determining correct orifice size of service regulators according to inlet pressure mailed upon request.

GROBLE GAS REGULATOR COMPANY
Office and Factory—Anderson, Indiana

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LAVA PILOT TIPS
American Lava Corp.
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Electric Weld-Steel.
LIQUEFIED PETROLEUM GASES
Philfuels Co.
LUGS—SOLDERING
Wolverine Tube Company.
LUX MATERIAL
Alpha-Lux Company.
LUX SPONGE
Alpha-Lux Company.
MANILA AND WIRE ROPE
C. W. Hunt Co., Inc.
MANOMETERS
American Meter Co.
Brown Instrument Co., The
Precision Thermometer & Instrument Company.
MASKS—GAS
Safety Gas Main Stopper Co
MAST & GAFF OUTFITS
C. W. Hunt Co., Inc.
MEASURING CHUTES
C. W. Hunt Co., Inc.
MECHANICAL GENERATORS
for Water Gas App.
United Engineers & Constructors Inc.
The Western Gas Construction Co.
METER CONNECTIONS
American Meter Co.
Bartlett-Hayward Co.
S. R. Dresser Mfg. Co.
Lambert Meter Co.
Pittsburgh Equitable Meter Co.
Superior Meter Co.
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American Meter Co.
Lambert Meter Co.
Superior Meter Co.
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American Meter Co.
METERS
American Meter Co.
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Air
Brown Instrument Co.
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Lambert Meter Co.
The P. H. & F. M. Roots Company.
The Sprague Meter Co.
Superior Meter Co.
United Engineers & Constructors Inc.
The Western Gas Construction Company.
Artificial
American Meter Co.
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Demand
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Demonstration
District
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Dry
American Meter Co.
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Exhibition
American Meter Co.
High Pressure
Natural Gas
American Meter Co
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Steam
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Test
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Superior Meter Co.
Wet Test
American Meter Co.
METER LEATHER
American Meter Co.
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MILLER GRIP PACKING
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MIXERS, GAS
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Smoot Engineering Corp.
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United Engineers & Constructors Inc.
MOTORS, AIR OR GAS
Connersville Blower Co.
MOTOR CARS
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NAPHTHALENE EXTRACTORS
Bartlett-Hayward Co.
The Gas Machinery Co.
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OIL HEATERS
Andale Co.
ORE, CHROME
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Quigley Co., Inc.
ORIFICE METERS
American Meter Co.
OVENS (BAKERS)
The Bruce McDonald Co.
Geo. D. Roper Corp.
OVENS, COKE AND GAS
Improved Equipment
Russel Engineering Corpn.
The Gas Machinery Co.
Semet-Solvay Engineering Corp.
The Stacey Mfg. Co.
The Western Gas Costruction Co.
OXIDE
Alpha-Lux Company.
Connelly Iron Sponge & Governor Co.
Gas Purifying Materials Co., Inc.
E. J. Lavino & Co.
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OXYGEN
Linde Air Products Co.
OXYGEN AND HYDROGEN METERS
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Superior Meter Co.
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Asbestos
Safety Gas Main Stopper Co
PACKING FIBRE
Refractory & Engineering Corpn.
PAINTS
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Inertol Co., Inc.
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The Stacey Mfg. Co.
Wailes Dove-Hermiston Corp.
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PAINTS, ANTI ACID AND ALKALI
Cheesman-Elliott Co.
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PAINTS, RUSTPROOF
Cheesman-Elliott Co.
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Quigley Co., Inc.
PENTANE
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PHOTOMETERS
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PILOTS-SAFETY
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PIPE
Waylow Pipe Co.
National Tube Co.
The Stacey Mfg. Co.
United States Pipe & Foundry Co.
The Western Gas Construction Co.
Bell
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McWane Cast Iron Pipe Co.
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Cast Iron
American Cast Iron Pipe Co.
Southwestern Pipe Joint & Eng Co.
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U. S. Cast Iron Pipe & Found-- Co.
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Cruse-Kemper Co.
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National Tube Co.
Pittsburgh Steel Products Co.
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Welded Steel
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Cruse-Kemper Co.
The Gas Machinery Co.
National Tube Co.
McClintoc Marshall Co.
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Quigley Furnace Specialties Co.
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The Gas Machinery Co.
Improved Equipment-Russell Engineering Corp.
The Koppers Construction Co.
Philfuels Co.
Stacey Bros. Gas Const. Co.
The Stacey Mfg. Co.
United Engineers & Constructors, Inc.
West Gas Improvement Co.
The Western Gas Construction Company
PLATES
Cruse-Kemper Co.
C. W. Hunt Co., Inc.
The Stacey Mfg. Co.
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Floor
Gas Engineering Co.
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McClintoc Marshall Co.
The Stacey Bros. Gas Construction Co.
United Engineers & Constructors, Inc.
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Rubber
Safety Gas Main Stopper Co.
Soft Wood
Safety Gas Main Stopper Co.
PORTABLE TEST METERS
American Meter Co.
Lambert Meter Co.
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American Meter Co.
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American Meter Co.
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Power
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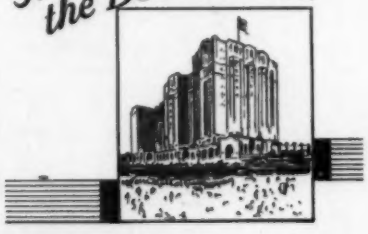

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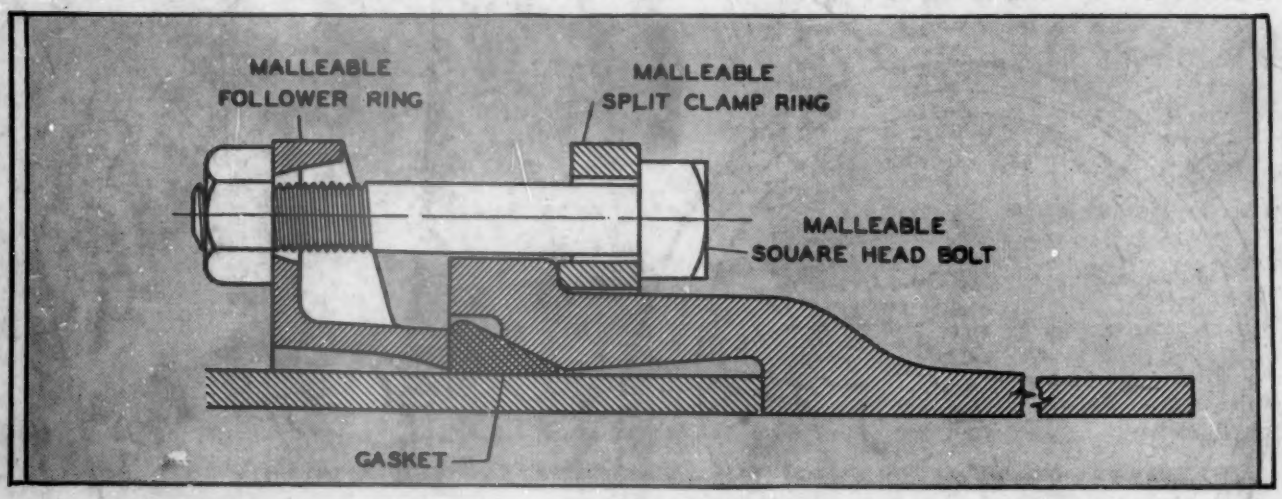

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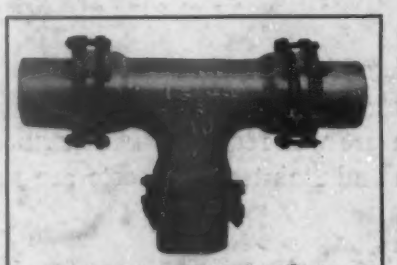

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